SEQ Interim Price Monitoring: Assessment of projected demand

A REPORT PREPARED FOR QUEENSLAND COMPETITION AUTHORITY

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The monopoly distribution and retail water and wastewater activities of Allconnex Water, Queensland Urban Utilities and Unitywater have been referred to the Queensland Competition Authority (QCA) for price monitoring. As a part of this process Frontier Economics (Frontier) has been engaged by QCA to review the demand forecasts prepared by the businesses.

The purpose of this report is to outline Frontier's approach and the findings resulting from our review of the businesses' projected demand schedules for the period 2010-11 to 2012-13. The report also includes a number of recommendations regarding long-term demand forecasting, the collection and collation of data and the alternative approaches available for generating robust and reliable forecasts of future consumption.

In undertaking the review we remain cognisant that the South East Queensland water sector appears at the centre of a confluence of events and uncertainties that make predicting water demand difficult. The sector has quite recently undergone significant structural reform and while such reform will ultimately benefit water users throughout South East Queensland it has resulted in a number of data succession problems that made the task of demand forecasting difficult.

The sector has also had to manage significant changes in the availability of water resources. Until quite recently a large proportion of South East Queensland was subject to severe drought conditions, and while normal rainfall patterns have returned, there is uncertainty about how customer behaviour responds to the lifting of severe water restrictions and how fast this response will be.

Despite these uncertainties, we have had to formulate a view on the outlook for water supplies and the likely customer response to the implementation of water conservation measures. In formulating this view, we have given consideration to the views and analysis provided by the businesses as well as the views and information of third party sources.

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

In the chapters that follow, we set out our views on good practice for demand forecasting and the type of information that economic regulators will generally seek as part of price reviews. We also consider the likely trend in resource availability and the resulting restrictions, population and demographic changes, the relationship between prices and demand and water users' responsiveness to price changes and water conservation measures.

Demand forecasting in a regulatory context

We have also provided the businesses with guidance regarding the collection and collation of data and demand forecasting in the context of economic regulation. We note that the regulatory structure for the sector is still under development, and our guidance and recommendations in this respect are by necessity broad in nature.

Box 1: Recommendations: demand forecasting

1. ***For the purposes of Frontier's review of demand forecasts, we adopted a set of standard best practice principles as the basis of our analysis. For future reviews Frontier recommends that QCA in consultation with the water businesses develop a set of high level regulatory principles to guide the development of demand forecasts. These principles would not only provide the businesses with guidance in terms of the QCA's expectations but would also form the basis upon which future independent reviews of demand could be conducted.***
2. ***Frontier recommends that businesses consider developing internal demand forecasting guidelines. These guidelines should set out the business's method for forecasting and the major assumptions underlying its forecasts. The benefits of such documents are twofold in that they ensure consistency in forecasting for operational decisions as well as acting as supporting documentation for submission to the QCA. Such a document should include:***
    - ***a description of the method adopted***
    - ***the statistical make-up of the forecasts, with particular attention to what local government areas have been used to generate growth numbers, what sources of information have been utilised and any assumptions regarding demographic change***
    - ***assumptions regarding water consumption behaviour, restriction levels and consumer responses, assumptions regarding consumer responses to prices***
    - ***assumptions regarding the derivation of sewerage volumes (where appropriate)***
    - ***assumptions regarding the approach to non-residential connections and volumes.***

3. ***Prior to the next price monitoring or price review businesses should seek to establish procedures and protocols for the collection and collation of data. At a minimum, businesses should collect:***
    - ***connections for residential and non residential water users based on the number of accounts***
    - ***connections for wastewater customers based on the number of accounts (residential, non-residential, recycled water customers and trade waste customers)***
    - ***volumetric consumption for residential and non-residential customers for potable water, wastewater, recycled water and trade waste.***

Demand assessment

Our report provides an assessment of the principal assumptions underlying the businesses forecasts, including levels of water use restriction, growth in connections and changes in customer behaviour.

Box 2: Recommendations: principal assumptions

1. ***Frontier accepts the businesses proposed assumption that restrictions will be held constant at PWCM over the course of the three year period.***
2. ***Frontier recommends demand forecasts be adjusted for price elasticity of demand in future reviews.***
3. ***Frontier recommends the PIFU growth rates as the most appropriate external benchmark for the businesses forecast growth in customer numbers.***

A business-by-business assessment is provided in chapters 4 to 6 of this report. We have amended several of the water businesses' demand forecasts. For all businesses Frontier recommends adjusting residential customer connections. Such adjustments also have a flow on effect for residential water volumes and residential wastewater connections.

Box 3: Recommendations: business-by-business

Allconnex Water

1. *After consideration of the further information provided by Allconnex Frontier recommends that water and wastewater residential connection numbers be adjusted accordingly to reflect the PIFU 2010 growth rates for dwellings.*
2. *Frontier recommends that Allconnex's projected volumes be adjusted to account for amended connection numbers.*
3. *Going forward, Frontier recommends Allconnex keep volumetric records for trade waste customers in the Logan and Redland areas. In the event that Allconnex extends volumetric trade waste charges to Gold Coast customers, it should also keep volumetric records the Gold Coast.*
4. *Going forward, Frontier advises Allconnex to keep volumetric records for all recycled water sold.*
5. *Frontier recommends Allconnex review its long-term demand forecasting methodology as part of its ongoing business planning and improvement program.*

Queensland Urban Utilities

1. *In consideration of QUU's response, Frontier recommends that the PIFU growth rates be applied to the 2010-11 connections for water and wastewater residential connections.*
2. *Frontier recommends non-residential connections are amended to reflect anticipated demand over the period. However, Frontier does not have adequate information to make such amendments.*
3. *QUU's assumption about per person daily consumption is consistent with bounceback. Frontier has accepted these figures.*
4. *Frontier recommends QUU's forecast residential volumes be amended to reflect the amended growth rates for connections.*
5. *Frontier recommends that residential wastewater connections be amended to reflect the PIFU growth rates as per residential water connections.*
6. *Frontier has not amended QUU's trade waste connection forecasts but suggests that subsequent to the SEQ Interim Price Monitoring process QUU considers developing short-term*

demand forecasts for trade waste customers.

7. *Frontier accepts that the primary drivers for long-term demand forecasting and short-term forecasting differ as described by QUU.*

Unitywater

1. *In the absence of any further information Frontier recommends that water and wastewater residential connection numbers be adjusted accordingly to reflect the PIFU 2010 growth rates for dwellings*
2. *Frontier has not amended non-residential connections for either water or wastewater as it is concerned that historical data for non-residential connections indicate a relatively large degree of variance between the residential and non-residential connections. In the absence of information allowing for a more detailed understanding of the relationship between residential and non-residential users for Unitywater, Frontier has no basis upon which to make an amendment.*
3. *Frontier recommends adjusting Unitywater's residential volumetric forecasts to correct for assumptions regarding the end of the drought*
4. *Frontier recommends adjusting Unitywater's residential volumetric forecasts to reflect the PIFU dwelling growth rates.*
5. *Going forward, Frontier recommends that Unitywater collect volumetric data for trade waste customers.*
6. *Going forward, Frontier recommends that Unitywater collect data and generate demand forecasts for recycled water.*
7. *Frontier recommends that Unitywater review its long-term demand forecasting methodology as part of its ongoing development of a building block framework.*

1 Introduction

1.1 Background

The South East Queensland (SEQ) water sector has recently undergone significant structural changes including the amalgamation of the water and wastewater activities of 17 councils into three new businesses — Queensland Urban Utilities, Allconnex Water and Unitywater.

These businesses provide water and wastewater services including the distribution and reticulation of water and water recycling (but not stormwater drainage). Wastewater services include the collection and transmission of sewage, sewage treatment and disposal, and trade waste services.

As part of the process of structural reform these businesses are intended to be subject to economic regulation. As an interim measure, the monopoly distribution and retail water and wastewater activities of these entities have been referred to the Queensland Competition Authority (QCA) for price monitoring.

As part of this price monitoring process Frontier Economics (Frontier) has been engaged by QCA to undertake a review and assessment of the demand forecasts prepared by Queensland Urban Utilities, Allconnex Water and Unitywater.

The businesses have prepared demand forecasts for inclusion in their submissions to QCA that set out the revenue and expenditure they propose to undertake over the years 2010-11 to 2012-13. QCA is currently undertaking the 2010-11 Interim Price Monitoring of SEQ Water and Wastewater Distribution and Retail Activities that will assess the reasonableness of the proposals set out in the businesses' submissions.

The purpose of this report is to outline Frontier's approach and findings of its independent review of the businesses' projected demand schedules for the three year period 2010-11 to 2012-13. The report also includes a number of recommendations regarding the collection and collation of data and the alternative approaches available for generating robust and reliable forecasts of future consumption.

Frontier's review of the businesses' demand forecasts is an input into the QCA's consideration of the businesses' proposed expenditure and prices as part of the SEQ Interim Price Monitoring.

1.2 Scope of the review

Frontier has been asked by QCA to undertake the following tasks:

1. Review the information provided by the businesses.
2. Consider the availability of information.
3. Assess the comprehensiveness of the demand forecasting methodologies and the underlying data assumptions.
4. Assess the consistency of the methods employed and the underlying data assumptions with those of reliable third party reports.
5. Where appropriate provide alternative forecasts.
6. Report on the businesses' progress in achieving the systems and information needed for informed pricing and reporting.

It is important that the demand forecasts are as accurate as possible, as they are key drivers of the businesses' costs, revenue requirements and resulting prices. In assessing the demand forecasts Frontier has considered whether the forecasts:

- have been developed using appropriate forecasting methodologies or approaches
- reflect reasonable assumptions about the key drivers of demand
- use the best available information, including historical data that can support trends in demand
- take account of current demand and economic conditions.

The services under consideration are all regulated water, wastewater, trade waste and recycled water services.

1.3 Consultation

In developing this report Frontier has consulted with the businesses as extensively as possible within the timelines associated with the project.

Frontier conducted an initial round of consultation that provided all three businesses with an opportunity to brief Frontier on the methods and approaches used to generate the proposed forecasts. This consultation also provided the businesses with an opportunity to discuss any issues or matters of substance that may have arisen in connection with any requests for further information.

The consultation process was as follows:

- After an initial review, Frontier requested further information from the businesses
- A face-to-face meeting was held with all businesses. All three businesses had an opportunity to brief Frontier on the methods and approaches used to generate the proposed forecasts. This consultation also provided the businesses with an opportunity to discuss any issues or matters of substance that may have arisen in connection with any requests for further information.
- Frontier produced a draft report that contained a number of preliminary findings and a number of further information requests.
- The Draft Report formed the basis for further consultation. Frontier provided the businesses with an opportunity to receive a briefing of its findings via telephone conference as well an opportunity to meet with Frontier to discuss the findings and the businesses' responses.

Table 1 outlines the consultations that have occurred during the development of this report.

Table 1: Project consultation

Business	Date
Allconnex Water	13 September
Unitywater	14 September
QUU	15 September
Unitywater	1 October
Unitywater	4 October
Allconnex	4 October
QUU	5 October

1.4 Structure of this report

The remainder of this report is structured as follows:

- Chapter 2 discusses demand forecasting in a regulatory context, and explains the key drivers of demand and the forecasting models commonly used. It concludes by describing which data the businesses should collect.
- Chapter 3 discusses Frontier's approach in assessing the demand forecasts of the businesses and highlights the responses of the businesses to the Draft report.

- Chapter 4 presents an analysis of Allconnex Water's approach and Frontier's recommendations for the business going forward.
- Chapter 5 presents an analysis of QUU's approach and Frontier's recommendations for the business going forward.
- Chapter 6 presents an analysis of Unitywater's approach and Frontier's recommendations for the business going forward.

2 Demand forecasting in a regulatory context

This chapter provides an overview of the assessment of demand in a regulatory context. It includes discussions of demand under varying forms of economic regulation, the information requirements that regulators will generally require the differing requirements for assessment given the varying methods used to forecast demand and the establishment of overriding principles for robust demand forecasting.

2.1 The importance of demand in a regulatory context

Demand forecasts are a central component of economic regulation. Ensuring that the forecasts are as accurate as possible is a primary mechanism for reducing regulatory risk and promoting regulatory outcomes that maximise technical, allocative and dynamic efficiency.

The quality of demand forecasts has a direct impact on:

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

An important context for this report is that the regulatory framework for South East Queensland is currently being developed. It is worth noting that while in a broad sense demand is a primary driver of expenditure, pricing and service standards, the regulatory treatment of demand may change depending on the type of regulatory framework that is put into place. For example, the emphasis that regulators place on demand forecasts is generally greater under a price cap form of regulation than it is under a revenue cap, the reason being that businesses face different incentives under different forms of price control. Under a price cap, businesses may face an incentive to pursue overly conservative (low) forecasts in order to mitigate the risks associated with prices not achieving revenue requirements — lower demand forecasts enable businesses to charge higher prices. Under a revenue cap businesses do not face this incentive as they can roll forward any under recovery.

The regulatory treatment of demand may also vary across differing forms of price control based on the associated administrative and procedural requirements. For example, price caps will necessitate the forecasting of demand during the price

review for the entire regulatory period. Price controls using tariff baskets (depending on their structure) to accommodate price rebalancing during the regulatory period may also require the re-forecasting of demand on an annual basis.

Given the uncertainty regarding the detailed structure of SEQ's future regulatory framework, Frontier has approached the task of reviewing the demand forecasts as if they were being proposed under a price cap and should therefore be as robust as possible.

2.2 Principles for demand forecasting

The ultimate objective of demand forecasting is to generate the most reliable estimates of customer growth and service delivery over the forthcoming regulatory period or planning period. The more reliable the demand estimates, the more informed will be the choices businesses can make about expenditure and prices. Reliable demand forecasts are an essential component in delivering efficient operational and regulatory outcomes. It is important that the demand forecasts represent the best possible assessment of future consumption given the available information.

Eventually the reliability of these estimates will be tested against the actual growth and consumption. The result of these comparisons will itself be used to better inform future forecasts.

There are a number of high level principles that are relevant to any forecast (not just water). Any method used to generate forecasts should:

- be applied in an unbiased manner (that is due weight must be given to all the relevant factors)
- be appropriate to the situation and the nature of the market for services
- recognise and reflect key drivers of demand
- be based on reasonable assumptions using the best available information
- be assessed against any other existing forecasts and methodologies
- use the most recent data available, as well as historical data that can identify trends in demand
- take account of current demand and economic conditions, and reasonable prospects for future market development.

Similar principles have been articulated by regulators in other jurisdictions such as the Essential Services Commission (ESC) in Victoria and form the underlying basis for Frontier's assessment of the businesses' demand forecasts.

Recommendations

Frontier recommends that QCA in consultation with the water businesses develop a set of high level regulatory principles to guide the development of demand forecasts. These principles would not only provide the businesses with guidance in terms of the QCA's expectations but would also form the basis upon which future independent reviews of demand could be conducted.

2.3 Key drivers of demand

There are a number of key drivers that businesses should show consideration for when developing demand forecasts. These include:

- Population growth — population growth is a central component of forecasts for both residential connections and residential volumes. Population forecasts are especially important where businesses have adopted a litres-per-person per day approach to forecasting.
- Dwelling demographics — demographics such as dwelling density and occupancy rates are important considerations for how businesses translate population projections in to connection numbers. Demographics will also influence differences in the growth rates of detached dwellings and multi-unit dwellings and flats. Changes in occupancy rates have a direct impact on the consumption level per connection. Changes in relativities between detached dwellings and attached dwellings will also impact on demand forecasts where there are differing prices. Household ownership is another demographic that may affect forecasts. For example, in Queensland rental tenants of flats do not usually face volumetric charges. Consequently price elasticity of demand estimates cannot be applied to that component of volumetric water supplied to tenants to generate demand forecasts.
- Dwelling growth — dwelling growth is related to both population growth and demographics and can serve as an alternative measure of these. Most central statistical agencies produce series for both households and population. This is true for Queensland where the Planning and Information Forecasting Unit (PIFU) within the Office of Economic and Statistical Research (OESR) produces household forecasts. Dwellings are arguably more relevant to water forecasts as they relate directly to the number of connections a business expects to service over the regulatory period.
- Demand management and water conservation programs — there have been programs implemented by water businesses and government to undertake community education, promote the installation of water-efficient devices and develop other programs that will reduce demand. Expected outcomes of these programs need to be reflected in the demand forecasts.

- Trends in water use efficiencies due to the penetration of water efficient appliances and permanent water saving practices (such as the establishment of native gardens by households).
- Temperature and rainfall — temperature and rainfall are often considered to influence the consumption of residential water. For example, water use is expected to decline during periods of high rainfall due to a decrease in the outside uses of water.
- Prices and pricing structure — consumers respond to different price structures in different ways. For example, volumetric charges allow customers to change their behaviour in response to price. The level at which prices are set will also impact on consumption with the magnitude of this impact dependent on the price elasticity of demand.
- Current and proposed water restrictions — water use restriction policies affect consumption while the restrictions are in place, and have a residual effect for a period after the restrictions are lifted.

Non-residential users include commercial, government and in some case rural users. Non-residential users are far less homogenous in nature than residential users. Consequently it is much more difficult to define a set of drivers that are common or of common significance across all non-residential users. At a broad level the drivers for non-residential consumption will include:

- Economic growth — the current state of the economy may be an indicator of the level of commercial activity being undertaken. For example, the global financial crisis slowed down growth in commercial connections in 2008-2009.
- Sector-specific conditions — there may be certain factors that are specific to particular industries that could have material impacts on water or wastewater demands. The degree to which such factors are material will depend on the make-up of the water businesses' customers. For example, where a business provides material bulk water services to a number of electricity generators as customers, it may need to consider the possible impacts of carbon emissions policy on these customers' future operations and therefore consumption of water.
- Current and proposed water restrictions and water management programs — non-residential water users are also impacted by restrictions where they are applied to them. There has also been considerable recent water use efficiency achieved through the implementation of Water Efficiency Management Plans (WEMPs). These plans are aimed at assisting non-residential customers to identify opportunities to achieve cost-effective water savings.

The identification and quantification of relevant drivers should be accomplished via a progressive selection process that takes into consideration the statistical significance of each variable.

2.4 Methods of forecasting

There are three primary ways of forecasting demand that are common across water businesses. Each method has its own advantages and disadvantages. In a regulatory context each method may require slightly different information to be presented.

The primary methods used for water demand forecasting include:

- The simple litres per capita per day (LCD) method of analysing historical bulk (aggregated) water demand to determine an overall LCD figure which is then multiplied by the projected population. More recently usage is occasionally corrected for the influence of climate and weather using various regression techniques to obtain a 'climate neutral' average LCD demand for forecasting.
- A sector based approach which considers residential demand (single and multi residential properties), non-residential demand (commercial, industrial and institutional and sub-sectors within these) and non revenue water (real and apparent losses). An understanding of how water is used is generated for each sector which is then projected forward according to growth in sector-specific base units (e.g. number of residential connections, number and class of non-residential users) as deemed appropriate.
- An end-use analysis method, which uses a 'bottom-up' approach to explain historical usage (predominantly in the residential sector) associated with typical end uses such as toilets, bathrooms, washing machines and evaporative air conditioners. The demand for that end use is translated into aggregate demand by multiplying an individual end-use demand by frequency of usage, projected demographic growth (population, single and multi-residential dwelling numbers, occupancy as appropriate), and functions that reflect changes in the efficiency of the technology and mix of stock over time.

Both the sector-based approach and the end-use approach are amenable for review under an economic regulatory framework as they allow for the generation of estimates for each price being proposed and as such allow the regulator to access the businesses proposed revenue stream against its revenue requirement or maximum allowable revenue. Box 4 discusses the different applications of methods in other jurisdictions.

Box 4: Methods used in other jurisdictions

New South Wales

In NSW a number of different approaches are adopted. For example, for its 2008 review Sydney Water Corporation estimated an underlying base demand predicated on historical average after correcting for weather. The model is primarily regression based.

Sydney Water also developed estimates of water savings from demand side management, involving the use of alternative approaches, with forecasts supported by detailed end-use modelling. Sydney Water also used regression modelling to estimate the impact of various stages of restrictions would have on water demand.

Victoria

In Victoria the retail metropolitan businesses base their forecasts on an 'end use model'. The model is an industry based model that calculates total demand for water and sewerage volume based on end-uses — that is, the model generates forecasts of the water consumption associated with specific end uses (for example, appliances such as washing machines, dishwashers, and toilets based on brand and 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 retail metropolitan 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.

United Kingdom

Water consumption forecasting in the UK differs from Australia in that a significant proportion of residential water users are unmetered and subsequently a primary focus of consumption forecasting is deriving estimates for unmetered customers.

Water companies in the UK adopt a number of methods for forecasting consumption. It is worth noting that one the primary approaches is the micro-component approach. This approach is very similar in nature and execution to the end use approach developed in Victoria.

The three key aspects in micro-component forecasting are ownership, volume and frequency of use. Frequency of use represents current customer behaviour, volume per use is measured for appliances in actual use. For example modern washing machines have many programmes and so the range of volumes used are determined and ownership predictions are best determined by market studies.

2.5 Demand forecasts and regulatory information requirements

Whichever form of price control is adopted, as part of a price review regulators will generally expect businesses to outline a price path over the forthcoming regulatory period.

The general regulatory practice is that where a separate tariff or tariff component exists, businesses must provide a demand forecast for that tariff or tariff component, such that the demand multiplied by the price generates the business's total proposed revenue stream. Where a business proposes to change a tariff structure in a particular year of the regulatory period, then the demand forecast for that year should reflect the new tariff structure.

The level of output detail required for a demand forecast will vary depending upon a business's proposed tariff structure. Businesses with complex tariff structures (such as a multi-step seasonal water tariff, volumetric-based charging for sewerage, different tariffs for residential and non-residential customers or a number of different tariff zones) will require a more disaggregated forecast (and level of supporting information) than a business with no steps, no volumetric wastewater charges, and common tariffs.

The general information requirements needed for an independent review of demand for regulatory purposes are:

- Description of the forecasting method — written information describing the method or approach undertaken in preparing the demand forecasts, key issues addressed and assumptions adopted. This requirement is most readily satisfied through the development of an internal demand forecasting manual which can be used as a basis for ensuring ongoing consistency in demand forecasts for operational purposes and can also be submitted to the regulator as supporting documentation as part of a price review. Assumptions for residential customers include the proposed growth rates in connections, occupancy rates of dwellings, LCD figures and population growth rates. Assumptions for non-residential customers include proposed growth rates in commercial connections, response to WEMPs and changes in staff numbers.
- Forecasts of demand associated with each price being proposed for the regulatory period as well as historical information for the same demands. The extent of historical information required by regulators varies. In practice, the more material the demand forecast is to the revenue being proposed, the more information the regulator will seek.

Where prices are uniform across different customer classes (for example both residential and non-residential customers may face the same volumetric tariff) businesses will need to stratify forecasts in order to allow for meaningful analysis.

Demand forecasting in a regulatory context

At a minimum, forecasts need to be split between:

- Residential connections (water and sewerage)
- Residential volumes (water and sewerage), volume forecasts for sewerage are primary drivers in determining the adequacy of the proposed treatment costs and capital programs for wastewater.
- Non-residential connections (water and sewerage)
- Non-residential volumes (water and sewerage)
- Volumes and connections for individual and or grouped large users where their consumption characteristics warrant this level of detail. Separate demand forecasts for a major user(s) will be appropriate
- Seasonal forecasts – if a primary driver of costs or alternatively if businesses choose to propose seasonal or peak tariffs

Where businesses are adopting end-use models to forecast demand, they will need to provide the regulator with information regarding the assumptions associated with the penetration rates and subsequent water savings for each class of appliance.

Other information needed for the assessment of demand includes:

- a description of the way in which any base or theoretical year has been adopted to develop the forecasts
- any average consumption assumptions adopted, including justification for the way in which average consumption is expected to change
- assumptions adopted regarding the lifting or imposition of restrictions
- the results of sensitivity analyses undertaken
- demographic changes, such as trend changes in the number of occupants in each dwelling

Recommendations

Frontier recommends that businesses consider developing internal demand forecasting guidelines. These guidelines should set out the business's method for forecasting and the major assumptions underlying its forecasts. The benefits of such documents are twofold in that they ensure consistency in forecasting for operational decisions as well as acting as supporting documentation for submission to the QCA. Such a document should include:

- ***a description of the method adopted***
- ***the statistical make-up of the forecasts, with particular attention to which local government areas have been used to generate growth***

numbers, what sources of information have been utilised and any assumptions regarding demographic change

- *assumptions regarding water consumption behaviour, restriction levels and consumer responses, assumptions regarding consumer responses to prices*
- *assumptions regarding the derivation of sewerage volumes (where appropriate)*
- *assumptions regarding the approach to non-residential connections and volumes.*

Prior to the next price monitoring or price review businesses should seek to establish procedures and protocols for the collection and collation of data. At a minimum, businesses should collect:

- *connections for residential and non residential water users*
- *connections for wastewater customers (residential, non-residential, recycled water customers and trade waste customers)*
- *volumetric consumption for residential and non-residential customers for potable water, wastewater, recycled water and trade waste.*

3 Frontier's review

This review has occurred within the context of relatively recent and considerable structural change in the SEQ water sector. As stated earlier a number of water utilities previously operated by councils have been merged to form the three current retailers. These retailers, although still under joint ownership of the relevant councils, operate as separate corporate entities.

As can be expected and as experienced by Frontier during the review the restructuring has left the businesses with a number of legacy issues. In particular it became apparent during the review that there are a number of issues regarding the transfer of data from councils to the water businesses.

These data transfer issues result in a general lack of historical data regarding connections and volumes to different customer classes. In some instances businesses have had to develop demand forecasts in the total absence of any historical information.

The lack of historical data is exacerbated in that what data there is available from third parties is also subject to qualification. The Queensland Water Commission (QWC) has collected both connections data and volume data for an historical period based on local government areas. However, this data is not consistent over time as it also includes significant local council restructuring that occurred in 2008. In addition the data is unaudited billing data and as a result may contain errors relating to billing and meter reading.

Forecasting demand obviously becomes problematic in the context of an absence of historical data. Of the three retailers, this issue was most pertinent for QUU and Unitywater.

This difficulty was compounded by the timelines associated with the review. These timelines may have impeded the businesses' ability to obtain data from councils. However we do note that there is a commercial incentive for businesses to obtain these data outside of meeting their regulatory requirements. In response to our draft report, some businesses sought to make it explicit that the proposed demand forecasts are subject to further development. For example Allconnex stated:

> Allconnex Water relied on demand forecasts provided by the three councils. In this and in other areas Allconnex Water's submission is clear that current forecasts have been adopted as an interim position, and will be reviewed and refined as part of a wider program of business planning and improvement.

Going forward one of the most pressing issues for the future estimation of demand is to collect, collate and maintain historical databases of consumption and customer numbers. Businesses should pursue this issue with their relevant councils regardless of the outcome of this regulatory process.

Given the lack of historical data and the lack of viable alternative sources of data, Frontier has adopted a fairly conservative approach to its review of demand. The lack of historical trends makes it difficult to comment on the consistency of proposed demand with long-term trends.

3.1 The basis for Frontier's assessment

In providing this advice, Frontier has had regard to:

- the information set out in the businesses' submissions (and accompanying information templates) and any explanations that the businesses provided on the basis used to derive the forecasts including any assumptions used
- comparisons amongst the businesses of their forecasting methodologies and assumptions and resulting forecasts
- relevant Queensland Government policies related to the water industry that impact on demand management, pricing, water conservation, metering and recycled water
- readily available data and information that Frontier has available to assess demand forecasts — for example, historical volume and connection numbers collected by the Queensland Water Commission
- Frontier's own experience in preparing and assessing the veracity of forecasts of demand for urban water services in other Australian states.

Where Frontier did not agree that the businesses' proposed demand forecasts reflect these requirements, we provided the QCA with alternative forecasts where possible.

Its also worth noting that the data made available for Frontier on which to base its analysis contained a number of notable gaps. Frontier understands that is primarily due to the recent structural change in sector and the difficulties businesses appear to have in obtaining historical data collected by the pre-existing entities.

In terms of connections Allconnex Water was able to provide two years of historical data, QUU submitted historical data for Brisbane and Unitywater was unable to submit any historical data.

3.2 Frontier's analytical approach

On the basis of the information requests, responses to further information required and consultation with the businesses, Frontier has assessed the businesses' proposed forecasts and developed this report including findings for submission to QCA and for comment by the water businesses.

In the first instance proposed demand forecasts were assessed as to whether they:

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

Of particular importance in the assessment of the forecasts is the identification and reasonableness of the underlying assumptions regarding possible demand restrictions, consumer behaviour and growth. Frontier has assessed these assumptions with the following expectations as our starting point:

- Consumer behaviour and water consumption patterns should not vary significantly between the businesses. The profile of consumption by a resident in Brisbane should not vary to any large degree from a consumer on the Gold Coast.
- Consumers will behave in a similar way when confronted with increased water prices. That is, price demand elasticity should be fairly consistent across businesses. This is especially so for indoor water use.
- Given the geographical location of the businesses, and the interconnected nature of the SEQ water grid, there is an expectation that assumptions regarding resource availability should be broadly consistent across each business.

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.

Frontier has engaged with each business to understand why its assumptions differ from the other businesses. Our analysis also takes into account any relevant information that validates each business's approach included in their responses to our information requests.

In response to our draft report both Allconnex and Unitywater stressed that average residential consumption for Brisbane, Gold Coast and Sunshine Coast varies significantly. The businesses identified the primary drivers of such differences as the relatively greater prevalence of multi-unit dwellings in coastal areas and the relatively greater impact of tourism on these areas. Frontier has taken the responses into consideration in this final demand report (see Chapters 4 to 6).

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

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

As stated earlier, 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 the views of these third-party sources. We have engaged with the business concerned to understand why the assumptions they have used vary from those of third parties.

3.3 Assessment of underlying assumptions

This chapter outlines our overall assessment of the key assumptions underlying the businesses' proposed forecasts. An overview of or key findings in regard to the underlying assumptions are reported in Table 2.

Table 2: Project consultation

Assumption	Allconnex Water	QUU	Unitywater
Proposed dwelling occupancy rates	Accepted	Accepted	Accepted
Proposed consumption per connection	Accepted	Accepted	Upward revision for Moreton Bay in 2012
Base year connections	Accepted	Brisbane base-year figure for connections revised based on currently billing data	Accepted
Restrictions will remain at PWCMs for residential and non-residential properties for forecasting period	Accepted	Accepted	Accepted

The outcome of demand forecasting is a set of projections upon which capital and operating expenditure requirements are determined and prices are set to achieve the businesses' revenue requirements.

Businesses need to clearly identify and address the underlying drivers of demand. In developing demand forecasts for urban water use, there are a large number of variables that can potentially impact on forecasts. The most common relate to:

- Demand restrictions — the likely impact of any water restrictions that will apply and the impact of potential 'bounceback'[1] on consumption.
- Consumer behaviour — price demand elasticity impacts and the effectiveness of the various non-price water conservation measures proposed by the businesses and the penetration of water conservation appliances.
- Growth — future population trends and changes in demographics

3.4 Demand restrictions

One of the key factors that the businesses need to consider when developing their demand forecasts is their expectations about the availability of water over the next regulatory period. Water availability affects consumption in both the short term and the long term. Assumptions regarding water scarcity have a direct impact on projected water use restrictions and the implementation of targeted use programmes such as Target 200. Water restrictions are a demand side phenomenon in that they prohibit or limit specific uses of water, such as washing pavements or cars, watering of gardens on particular days etc.

Draft report findings

Most areas of South-East Queensland are no longer facing the severe drought conditions that were experienced during 2007 and 2008 (see box 5). The Queensland Water Commission (QWC) Annual Report 2009 highlights that at April 2009, high-level restrictions were eased to medium-level restrictions and Target 170 was eased to Target 200 for areas under QWC restrictions. Permanent Water Conservation Measures (PWCMs) were introduced in December 2009 and Target 200 now applies to all of South-East Queensland.

One exception to the general restrictions trend in South East Queensland is the Sunshine Coast region which has not been subjected to restrictions prior to the implementation of PWCMs.

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

Box 5: History of restrictions in SEQ

On 13 May 2005, 13 local councils in SEQ including Brisbane agreed to impose Level 1 water restrictions, due to low levels of inflows to water in storage.

These restrictions were increased to Level 2 from 3 October 2005 with the exception of the Gold Coast which had been subject to Level 5 restrictions since 2004.

Level 3 water restrictions were imposed on the region from 13 June 2006 amid projections that water storage levels would drop to 5% within 26 months.

Water restrictions continued to increase, to Level 4 from 4 November 2006, Level 5 from 10 April 2007, and up to Level 6 from 23 November 2007.

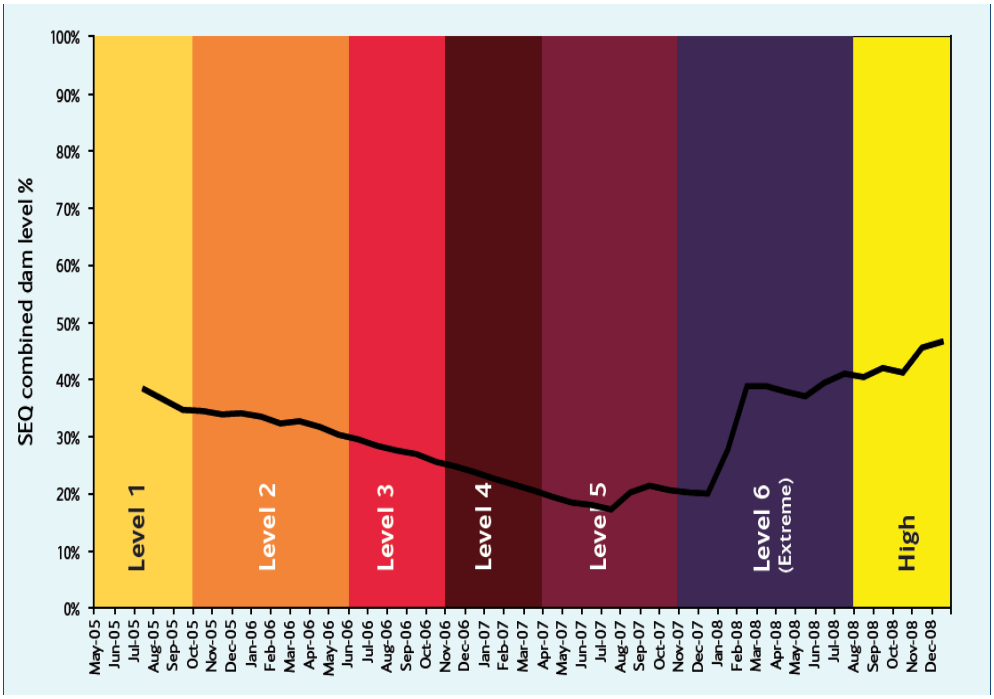
High level restrictions were introduced on 31 July 2008 and were subsequently relaxed on 11 April 2009 to medium level restrictions.

Currently, the SEQ councils (as well as the Sunshine Coast which never had restrictions imposed) are subject to PWCMs which were introduced from 1 December 2009.

Source: South East Queensland Water Strategy

The focus has now shifted from a system of strict regulation of residential water use to a system of continuous encouragement to reduce water consumption via the measures contained in the PWCMs. South-East Queensland combined dam levels increased from very low levels of below 20% in mid-2007 in Figure 1 to levels above 80% for most of 2010 (not shown).

Figure 1: SEQ combined dam levels and restrictions, 2005-08



Source: Queensland Water Commission: The 2008 Water Report

Dam levels have continued to increase throughout 2010. As of 15th October 2010, the combined dam-water level for South-East Queensland was 100.0 %[2].

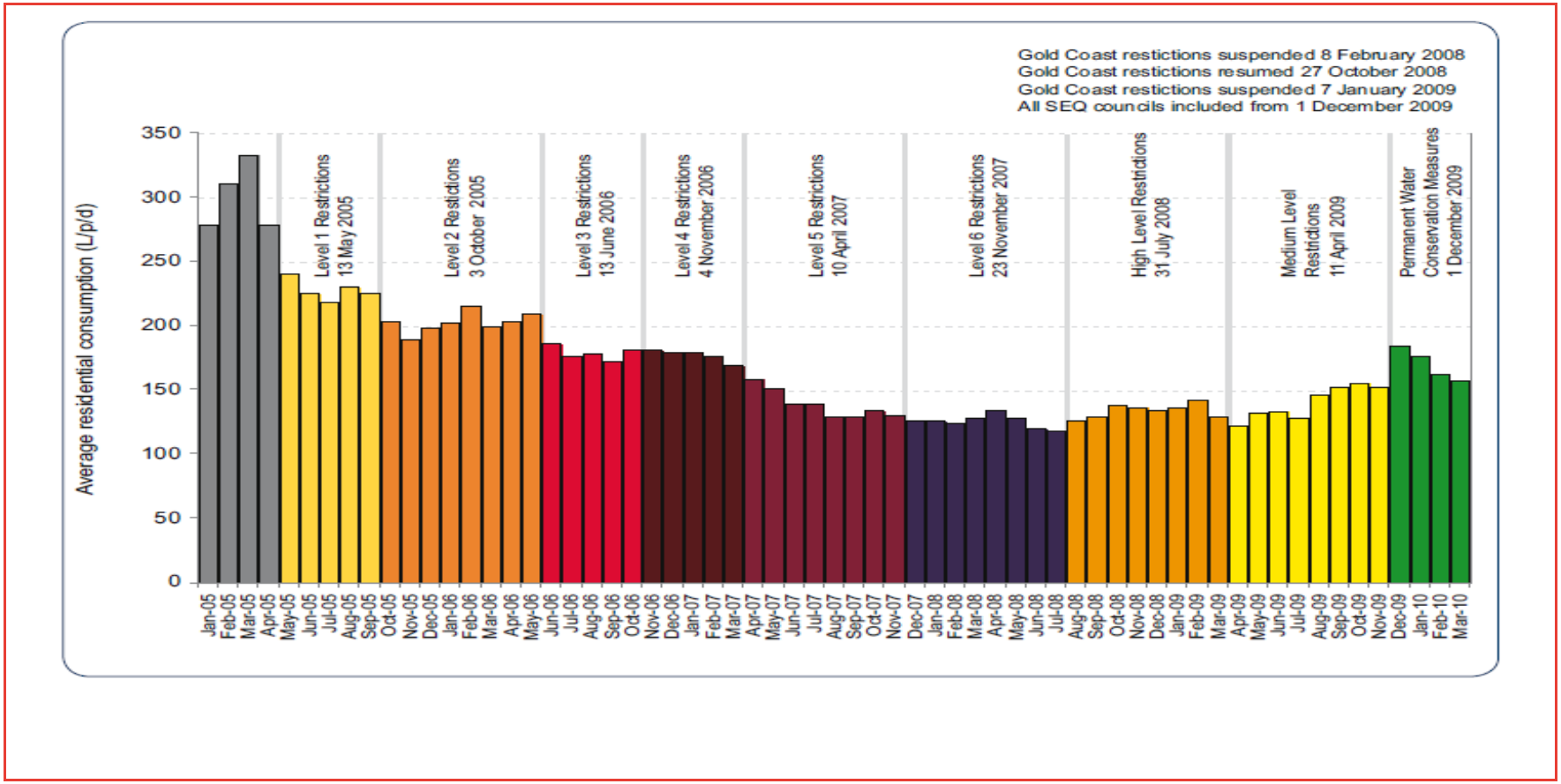
Average SEQ water consumption in 2010 has been maintained below 200 litres per person per day for every month (see Figure 2).

Consistent with current trends in water availability no water business is assuming restrictions greater than PWCMs over the period 2010-11 to 2012-13. The primary impacts of PWCMs across SEQ are:

- Efficient sprinklers and hoses can be used to water gardens and lawns (but not from 10am to 4pm or on Mondays) and as long as watering is done in accordance with guidelines.
- Vehicles and outdoor areas can be washed at any time – as long as water is used efficiently.
- New pools can be filled with town water and existing pools can be filled as long as efficient fittings are in place.
- Rainwater can be used at any time.

2 Data taken from http://www.qwc.qld.gov.au/

Figure 2: Average Residential Water Consumption 2005-2010



Source: South East Queensland Water Strategy

Frontier's review

These restrictions are relatively light compared to the more stringent water use restrictions previously imposed in Queensland and the restrictions imposed in other jurisdictions. Consequently, Frontier anticipates that their impact on demand will be relatively minor.

Frontier is also of the view that it is reasonable to expect PWCMs to be applied over the three year period in question given that they constitute a long-term demand management instrument.

In relation to non-residential water consumption, the following restrictions apply over the period:

- Water users consuming more than 10 million litres a year must comply with their Water Efficiency Management Plan to achieve 25% savings or best practice water use.
- Water users consuming more than 1 million litres a year must have water efficient appliances, such as low-flow taps, trigger sprays, showerheads, urinals and cooling towers.
- Vehicle washers must only use water in accordance with guidelines.
- Commercial pool and spa operators must keep a weekly log and install a rainwater tank, a sub-meter and a clear view screen in the backwash outlet line where required, together with a range of water efficient fittings.
- Operators of visitor accommodation must display water conservation information in bathrooms.
- Business and industry must provide compliance reports and face penalties for non-compliance.

The majority of non-residential water restrictions are aimed at achieving permanent water savings through investment in more efficient water use technologies.

The measure that poses the greatest potential impact on water volumes is the requirement to achieve 25% savings through the implementation of a WEMP. While it is unclear from the businesses' demand forecasts how such savings have been accounted for, we anticipate that given the WEMP process is now mature a significant proportion of the associated savings have already been captured and should be subsequently reflected in the historical data for consumption.

Given that Frontier accepted the underlying assumptions that businesses were proposing over the forthcoming period, no business had a material response to the draft report regarding restrictions.

Recommendations

Frontier accepts the businesses proposed assumption that restrictions will be held constant at PWCM over the course of the three year period.

3.5 Consumer behaviour

Consumer demand can be affected by both price and non-price related factors.

3.5.1 Price related behavioural effects

Draft report findings

Changes in prices over the regulatory period will affect demand as reflected in the price elasticity of demand (i.e. 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.

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

In particular businesses need to be clear about how they treated elasticity in relation to residential and commercial customers when producing the demand forecasts. Residential water use is generally considered to be much less elastic than commercial water use. The reasoning here is that commercial users have both more flexibility in the possible response to price and also have greater incentives to pursue efficiencies given the commercial nature of the activities they undertake. Residential water demand is often considered to be less elastic due to the essential nature of some residential uses (such as basic hygiene and rehydration).

No water business has applied price elasticity of demand estimates to forecasts for residential or non-residential water users. Our general approach adopted for the draft report has been to interpret the exclusion of elasticity as an assumption by the businesses of a price elasticity of zero (that is demand is unresponsive to any increase in price).

In our draft report we stated that Frontier considers that such an approach is inappropriate given the relative easing of restriction levels across the majority of areas serviced by the three businesses coupled with the proposals by businesses to materially increase some volumetric prices. It is reasonable to assume that as restriction levels are relaxed consumers' discretionary use of water will increase. As a result, we expect consumers to respond more noticeably to price increases, although the absolute price elasticity impacts will remain quite low.

We acknowledged that there are a number of issues associated with applying elasticity estimates to demand forecasts. These include:

- a lack of quantitative studies specific to Australia
- the presence of embedded permanent water savings

- non-price based behavioural change, such as the imposition of conservation measures

Consistent with our framework, our starting point for assessing price elasticities used has been third party views. For this purpose, in our draft report we sourced price elasticity information from the Water Supply Association of Australia (WSAA 2004) which has published the following price elasticity figures:

- Indoor consumption — for every 10% increase in price there will be a 0.5% reduction in demand; and
- Outdoor consumption — for every 10% increase in price there will be a 1.5% reduction in demand.

These elasticity estimates were adopted in the recent Victorian metropolitan and urban water price reviews. We acknowledged that it would be preferable to use more business specific or alternatively more recent estimates. However, in the absence of such estimates we adopted the WSAA elasticities.

In relation to non-residential customers we note that such customers are far less homogeneous in their water consumption profiles than residential customers. Consequently, it is inappropriate to apply universal assumptions regarding demand price elasticity to such customers.

We also note that the ongoing implementation of the WEMP program encourages non-residential customers to invest in water saving technologies. The uptake of water efficient technologies and changes in water use behaviour are in and of themselves the primary avenues through which consumers would respond to price increases. Price elasticity of demand by definition measures the responsiveness of demand to changes in price. Where prices increase we would expect to see consumers limiting their demand by adopting more efficient water use practices. For this reason we believed that applying an elasticity assumption to non-residential customers' risks overstating their responsiveness to price increases.

Response to the draft report

In response to our draft report Unitywater indicated that the prevalence of tourism in coastal areas made comparisons across regions problematic (e.g. between Brisbane and Sunshine Coast) and that further:

> Tourists are inelastic to water price signals tourists travel for family destination or experience reasons they are generally not economically inclined. Price elasticity is dampened by tourism and we submit it is close to nil at current levels.

Unitywater also responded to the draft by stating that price elasticity is only applicable to discretionary residential usage not base flow usage per capita. Unitywater's response also stated that:

> use of WSAA elasticity estimates was inappropriate due to seasonal variations between Victoria and Queensland. Unitywater stated that anecdotal evidence suggests elasticity is low to nonexistent at current price levels. However, it also indicated that it did not have access to empirical studies.

Allconnex's response to the draft report stated:

> Historically councils have not explicitly considered price elasticity of demand (or income elasticity, that Frontier does not address) impacts in forecasting water consumption. By Allconnex Water relying on council forecasts, Frontier should not consider that a zero price elasticity factor represents Allconnex Water's considered view. ... Allconnex Water intends to consider further the appropriate, if any, price-response factor to incorporate in future water demand forecasts.

Allconnex raised a further complication for the application of elasticity for residential users in that the Residential Tenancies and Rooming Accommodation Act 2008, section 166[3] provides that tenants in properties in SEQ do not in most cases receive water or wastewater bills (which are sent to landlords). Allconnex estimated that, in the Gold Coast district, many properties are either tenanted or tourist rentals and subsequently those using water do not receive water bills.

In relation to non-residential water users Unitywater stated that it expected:

> small to medium commercial and industry usage to be largely inelastic at the current price levels per unit. Sophisticated commercial and industrial customers may be price elastic but unless water is a material input in to production then it is merely one input into their factors of production. Hence the noise between signal and outturn usage patterns may dampen or distort the relationship.

Frontier's conclusions and recommendations

During the course of the consultation program it became apparent that there were a number of issues regarding the application of elasticity estimates to demand. Whether price elasticity of demand applied to water services was one such issue. Economic theory suggests that residential water consumption should be inversely related to water price. As a commodity with few substitutes, the price elasticity of demand should also be inelastic.

Frontier notes that water use does respond to changes in price. The literature plainly shows that when sufficient data are collected and controlled for other influences on water use the effect of price emerges quite clearly. These effects are evident in previous studies. For example Borland (1984)[4] reviewed over 50 international quantitative studies of urban water use all of which found that price

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3 Lessors are only able to pass on volumetric water costs to tenants if the rental premises are individually metered, the rental premises are water efficient and the tenancy agreement states that the tenant must pay for water consumption.

4 Boland J, Benedykt D, Duane D, Baumann D (1984) Influence of price and rate structure on Municpal and Industrial Water use IWR Report 84-C-2.

had an impact on water use. Baumann (1998)[5] made similar observations in reviewing 50 additional studies post 1984. More recently an empirical survey of residential water demand modelling by Worthington and Hoffman (2008)[6] considered approximately 40 studies, none of which concluded that price had no impact on demand. Some of the more recent Australian demand studies from the Worthington (2008) review are reported in Table 3.

Table 3: Empirical estimates of price elasticity of demand

Author	Price Structure	Regression Variables	Elasticity
Hoffman, Worthington and Higgs (2006) Sample: Brisbane, Queensland, 1998-2003.	Two-part tariff with 0 allowance and flat rate	Average quarterly household water consumption regressed on marginal price of water; household income and size; number of rainy and sunny days in a quarter: and a summer dummy.	0.51
Dandy, Nguyen and Davies (1997) Sample: Adelaide, South Australia, 1978-1992.	Increasing block and flat rates	Annual household water consumption regressed on quantity of water consumed in the previous year, annual allowance, dummy variables for consumption in excess of allocation, property value, household size, number of rooms climate	0.28
Barkatullah (1996) Sample: Sydney, New South Wales, 1990-1994.	Increasing block and flat rates	Quarterly household water consumption regressed on Nordin-difference variable, marginal price, average temperature, lagged rainfall, income, property value, peak/off-peak dummy, household size, number of bedrooms and bathrooms, garden condition	0.21
Thomas and Syme (1988) Sample: Perth, Western Australia (1982)	Flat rate	Annual water consumption from mains supply regressed on marginal price, difference variable, average household income, annual precipitation, restrictions on public water supply use, hours, average household size, percentage of households which use a private underground water bore.	0.18
Martin and Thomas (1986) Sample: Kuwait, South Australia, Western Australia, Arizona, 1978/79 and 1981/82	Various volumetric charging systems	Mean daily per capita water consumption regressed on marginal price	0.50

Source: Worthington A, Hoffman M (2008) An empirical survey of residential water demand modelling, Journal of Economic Surveys (2008) Vol 22, No 5 pp 842-871

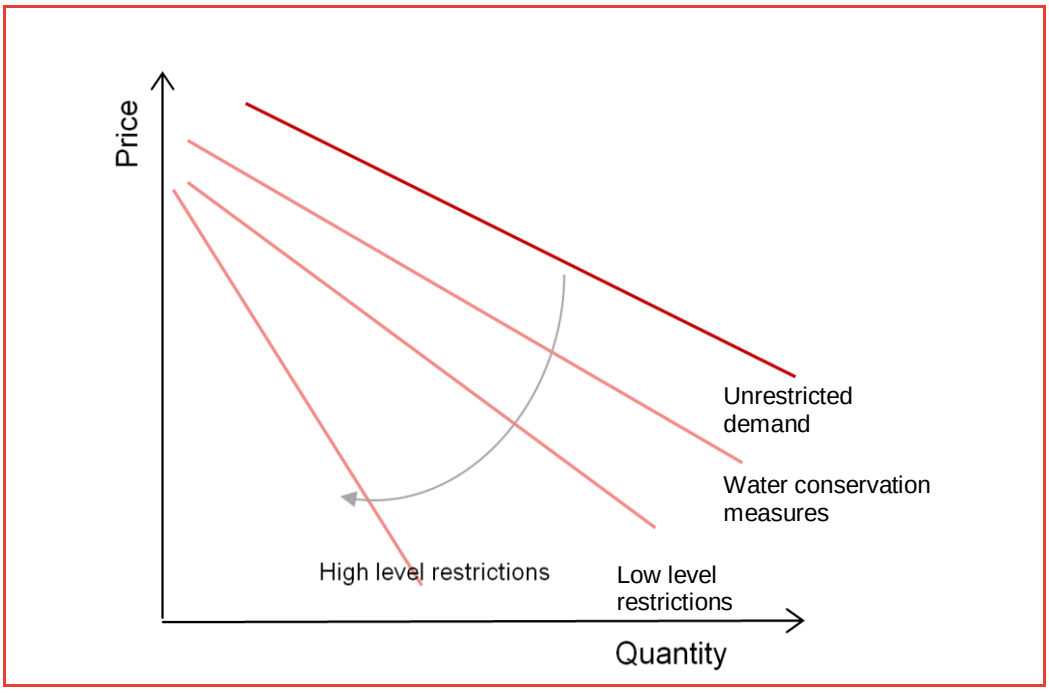
5 Baumann D, Boland J, Hanemann W (1998) Urban water demand management and planning, McGraw-Hill ..

6 Worthington A, Hoffman M (2008) An empirical survey of residential water demand modelling, Journal of Economic Surveys (2008) Vol 22, No 5 pp 842-871.

A related issue was the contention that price elasticity of demand did not apply during periods of restrictions on water-use. Any residential user's demand is the summation of their demand for water arising from their uses of water for hygiene purposes, their uses of water for cooking and hydration along with their use of water for outdoor activities such as gardening or for recreational activities such as maintaining swimming pools.

Any prohibition or constraint placed on any of these activities will directly affect that customer's demand for water, the result being that their demand schedule will contract and most likely become more inelastic. Figure 3 shows the expected impact of levying water use restrictions on a residential customer's demand.

Figure 3: Expected impact of use restrictions on residential demand



As restrictions are levied demand contracts and becomes more inelastic (assuming restrictions are placed on uses considered to be more discretionary in nature). By definition price elasticity of demand will only reach zero where demand becomes perfectly inelastic. Frontier considers it reasonable to expect that price elasticity of demand is relevant even under periods of restriction.

In relation to Allconnex's observation regarding the prevalence of tenanted residences Frontier agrees that elasticity would have to be adjusted to account for customers that do not receive a water bill. Elasticity should only be applied to customers who have an ability to respond to price increases through volumetric tariffs.

Frontier notes that both Allconnex Water and QUU responded to the draft report by stating that prices reported in the information template do not represent actual price paths but rather average proposed revenues. Allconnex stated that its:

> Pricing strategy is defined only for the FY10/11 — there has been no detailed consideration as yet as to the structure of any price adjustments for future financial years, and therefore the possible application of a price elasticity factor cannot yet be determined.

Although Frontier remains of the position that elasticity is material, it agrees with both Allconnex Water and QUU that it is methodologically unsound to apply elasticity factors in the absence of actual proposed prices. Subsequently Frontier has not adjusted demand forecasts for price elasticity of demand in its final recommendations.

Recommendations

Frontier recommends demand forecasts be adjusted for price elasticity of demand in future reviews once forecast prices and price components are provided along with corresponding demand estimates

3.5.2 Non-price related behavioural effects

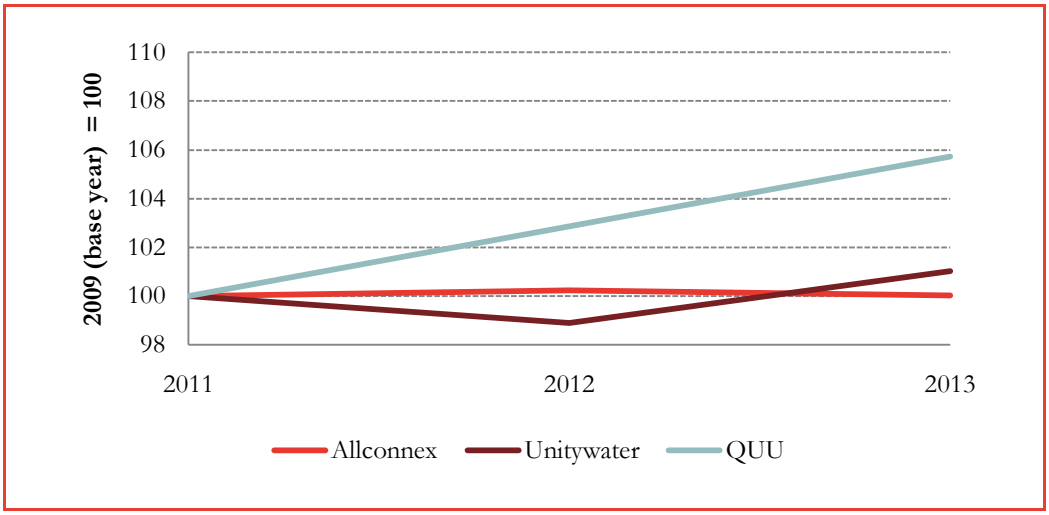
Draft report findings

The businesses' forecasts may also reflect the implementation of non-price water conservation measures over the period. These may include water efficient appliance programs, indoor retrofitting and business efficiency programs.

Most notably, in some instances businesses appear to have adopted per capita consumption targets eg T 200 as the basis for their residential water demand forecasts. The impact of assumptions at a per connection level for residential water customers is shown in Figure 3. The figure charts the growth rates associated with each business's per connection consumption levels. An index has been used as it allows for direct comparison of the underlying assumptions.

As can be seen from the graph each business has proposed markedly different growth profiles for residential consumption per connection over the three year period. QUU is proposing consumption will gradually increase. Unitywater is proposing consumption per connection will initially decrease before increasing into 2013. Allconnex is proposing consumption per connection will be relatively stable over the course of the period declining slightly in 2013.

Figure 4: Growth in consumption per connection



Source: Frontier estimates based on business submissions to SEQ Interim price monitoring 2011.

Base year (2011) residential consumption per connection for Unitywater is 157kl. Base year consumption per connection for Allconnex is 189kl. Base year consumption levels for QUU are 151kl.

QUU's proposal is more consistent with Frontier's expectations of a gradual bounceback associated with the easing of restrictions to a PWCMs level.

As a general rule, targets should not be used to forecast consumption reductions expected to be achieved. Forecasts should ideally reference historical trends and any anticipated changes or events expected to occur over the forecast period. Basing forecasts on the achievement of targets may prevent businesses from forecasting demand where it outperforms the target or alternatively does not allow for situations where the targets are not achieved.

We appreciate that there may be issues related to collecting and collating an appropriate level of historical data on which to base future expectations. However the use of targets to generate consumption forecasts is not consistent with best practice demand forecasting.

Response to the draft report

In response to the Draft report Unitywater noted that the growth rates in consumption per connection are a combination of assumptions for different factors and different regions. They identified two underlying factors explaining the mid-term dip in consumption levels:

> Projections are based on the assumptions the two regions made when preparing their data books for the water Reform Program due diligence. Moreton Bay assumed consumption per person would stay the same and then increase in 2013. This was because in the bulk water valuation they nominated this year as the year they would be impacted by recovery from the drought. This causes the observed increase in the Moreton growth rate per connection in 2013. Another impact is from a change in the

> occupancy rates underlying the PIFU forecasts in 2012 of a reduction of 1.4% this causes the drop; in the growth rate per connection for Moreton in 2012.

In response to the draft report Allconnex stated that the demand forecasts provide by participating councils were:

> Informed by the State's Target 200 figure, but were not simply hard coded to this amount. In the case of the Gold Coast a forecast above 200 L/p/d was applied, based on observed consumption in that district. In Logan and Redland while the forecast of 200 L/p/d was based on the Target 200 campaign, in both districts observed consumption levels were very close to 200 L/p/d and recognising other uncertainties the Target 200 value was applied as an interim forecast.

Frontier's conclusions and recommendations

Frontier has revised Unitywater's L/p/d figures for Moreton Bay to reflect that the drought ended earlier than the Moreton Bay Regional Council expected. No change has been applied to the Sunshine Coast region L/p/d figures.

Frontier accepts that there is little value in adjusting Allconnex's forecasts to account for actual consumption levels where such adjustments would be immaterial.

3.6 Growth in connections

Draft report findings

Another 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 effect on residential consumption.

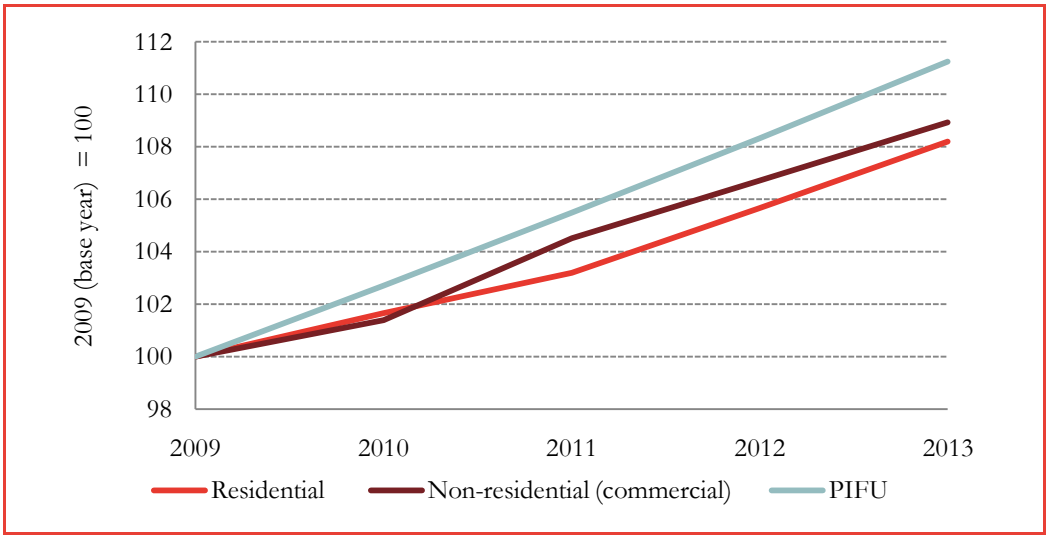
Growth in customer numbers is complicated by the fact that such numbers are based on household connections as opposed to population. Consequently, it is important that the businesses' forecasts show how household numbers are forecast to change over the period and any anticipated trends in household composition.

For example, household numbers may exhibit growth which would imply anticipated increases in consumption. However, where there are changes in demographics such as decreases in household size, consumption per connection may be declining, implying that the level of demand growth may need to be adjusted downward.

In assessing the demand forecasts, Frontier has compared the businesses' assumptions regarding growth and demographic change with those outlined by the Planning Information and Forecasting Unit (PIFU).

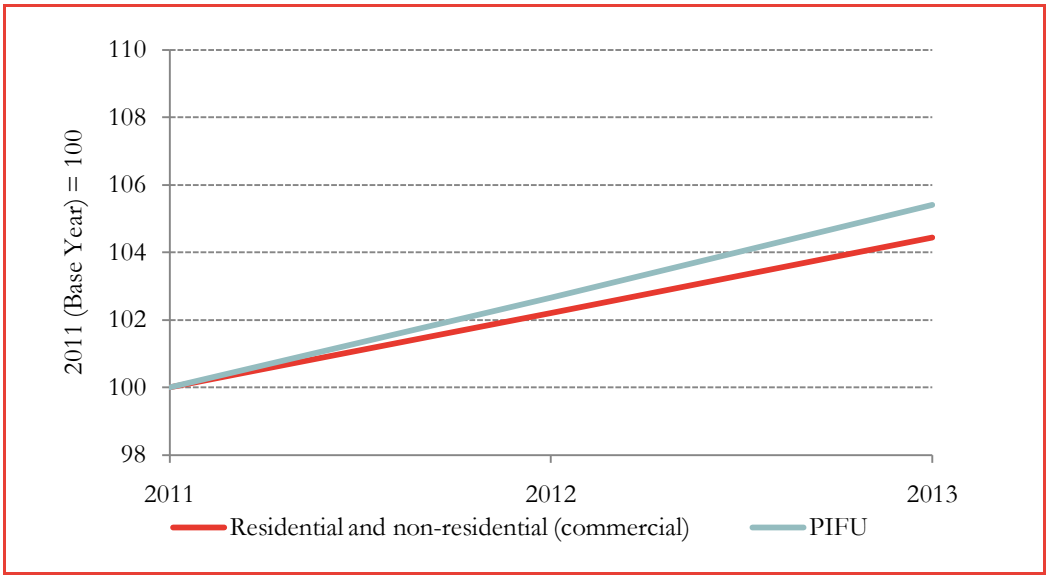
Aggregate connection numbers for both residential and non-residential customers are outlined in figures 5 to 7. The figures chart the different growth assumptions proposed by the businesses against the growth assumptions outlined in the PIFU data series dwelling projections, local government areas 2010.

Figure 5: Allconnex proposed connections growth



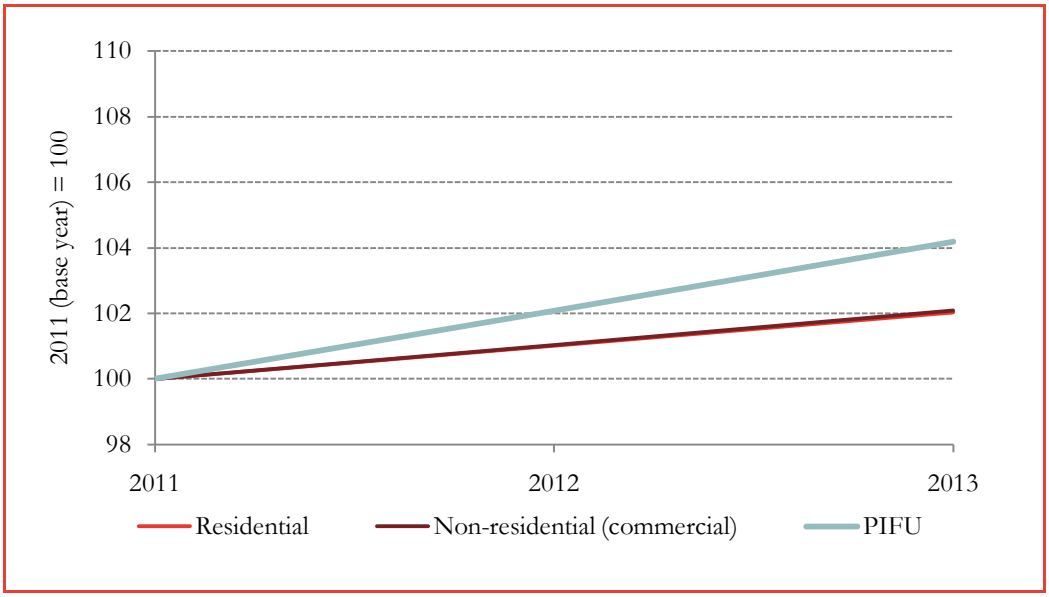
Source: Frontier estimates based on PIFU data and business submission to the SEQ interim price monitoring 2011

Figure 6: Unitywater proposed connections growth



Source: Frontier estimates based on PIFU data and business submission to the SEQ interim price monitoring 2011

Figure 7: QUU proposed connections growth



Source: Frontier estimates based on PIFU data and business submission to the SEQ interim price monitoring 2011.Note that the trend lines for QUU's residential and non-residential connections are too close to graphically distinguish here.

In general, Frontier believes that all three businesses have proposed relatively conservative demand forecasts for residential connections. When compared to the growth assumptions underlying the PIFU dwelling forecasts, each business has proposed annual growth less than that of PIFU. No business has provided Frontier with a compelling reason for doing so. In its draft report Frontier adjusted forecasts for all three retailers to reflect the PIFU growth rates.

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

Methods used to derive non-residential growth rates range from regressing growth in non-residential customers on growth in residential customers through to simply adopting the ratio of historical non-residential growth rates to residential growth rates. On the basis of the data provided by the businesses it is generally unclear which approach the businesses have adopted (the exception being where businesses appear to have applied a single growth factor to both residential and non residential customers eg Unitywater and QUU). We recognise that the absence of reliable historical data makes it difficult to forecast growth in non-residential customer numbers.

Response to the draft report

In response to the draft report Allconnex stated that its forecasts were developed by each of its participating councils during 2009 and reflect each council's expectations of future growth at that time. Allconnex also stated that there were a number of reasons that connections differ from the actual PIFU dwelling numbers, including:

- connections represent physical or deemed connections to the network rather than total number of households
- Allconnex does not service every house with water/wastewater services
- in some instances, Allconnex charges properties that do not contain dwellings.

Unitywater responded to the draft report by stating that it was

> unaware of a detailed publically available document outlining the source data, modelling assumption or scalers used by the Office of Economic and Statistical Research to produce PIFU growth numbers. Nor has Unitywater reconciled the differences between PIFU and its own forecasts.

Unitywater's response stated that:

> It is somewhat preliminary given available data to discount its existing methodology in preference for the PIFU's data set without undertaking substantial research. Unitywater as part of its preparations for the first reset will be reviewing all elements and inputs into its building block proposal and the demand forecasts short term and long term are critical components of that work.

Frontier's conclusions and recommendations

In consideration of the businesses' responses Frontier considers that the issues raised by Allconnex are most likely common across all businesses. Frontier accepts that the number of connections and households may diverge due to customers who do not receive sewerage services or water services.

However, we remain of the view that the growth numbers associated with the PIFU dwelling projections are an adequate proxy for growth in connections. This is particularly so given that most new customers are expected to connect to both sewerage and water networks.

Frontier also takes on board Unitywater's comments but notes that one of the primary functions of this review is to assess the robustness of forecasts against reliable third party sources.

We have noted that there is a lack of historical data and that what historical data exists are heavily qualified. Table 4 reports both the proposed growth rates and those available from other sources. It is worth noting that the time periods under consideration are not the same and that the rates should only be treated as indicative.

Table 4 describes the annualised growth rates for each LGA and over which period the annualised growth rate was derived from. For example, the SEQ Regional Plan figures were annualised over a 25-year period while the PIFU figures were annualised over a 10-year period.

Table 4: Annualised growth in connections by LGA[7]

LGA	2006-2031 SEQ Regional Plan	2006-2016 PIFU	2011-2013 Proposed	2008-2010 QWC
Brisbane (C)	1.3	1.6	1.0	2.9
Gold Coast (C)	2.2	3.0	2.3	0.7
Ipswich (C)	4.8	4.5	1.0	3.0
Lockyer Valley (R)	2.8	3.1	1.5	3.5
Logan (C)	2.3	2.4	2.2	3.2
Moreton Bay (R)	2.1	2.8	2.4	2.3
Redland (C)	1.4	2.4	1.4	1.7
Scenic Rim (R)	2.8	2.9	1.5	3.8
Somerset (R)	2.8	2.6	1.0	4.8
Sunshine Coast (R)	2.3	2.7	2.0	10.7

Source: Frontier estimates based on data from SEQ Regional Plan, PIFU projections for dwellings, Allconnex estimates and Council submissions to the Queensland Water Commission

Frontier notes that there is publicly available detailed methodology papers explaining the development of the PIFU forecasts. These documents are available on the PIFU website[8]. PIFU is a component of the Office of Economic and Statistical Research (OESR) and is a provider of strategic planning information and analysis. The unit provides data and information in relation to

7 The local government area (LGA) is a spatial unit that represents the geographical area under the responsibility of an incorporated local government council, or an Aboriginal or Island Council. An LGA may be a City (C), Regional Council (R), Shire (S) or Town (T).

8 http://www.oesr.qld.gov.au/products/publications/household-dwel-proj-qld-lga/index.php

population dynamics and forecasts to clients at all levels of government and in the private sector.

The starting point of PIFU population projections is the Estimated Resident Population (ERP) of Queensland based on data from a 2006 census. Broadly speaking the development of the projections follow a simple four step process:

Step 1: Determine projected population based on 2006 ERP census data.

Step 2: Apply projected living arrangements (based on 1996 to 2006 observations) to projected population to determine projected residential households. A propensity trend method has been employed by PIFU to forecast the number of households in SEQ. The forecasted number of households is mainly determined by:

- the number of people in each sex and five-year age group; and
- the projected propensities for different living arrangements.

Step 3: Using dwelling vacancy rates, scale up projected households to projected dwelling stock.

The PIFU analysis distinguishes between residential households and dwelling numbers. Total private dwellings comprise residential households and vacant households. Vacant households are either unoccupied at that point in time of the analysis or occupied by visitors or holiday-goers. Non-private dwellings are not included in the PIFU report. The following equation explains the composition of total private dwellings:

$$Total\ Private\ Dwellings = Resid\ Households + Vacant\ Households$$

Step 4: Determine change in number of dwellings based on demolitions, conversions and removals contained in specific local government area (LGA) data to obtain underlying demand for new dwellings.

An alternative to the PIFU growth rates is to use those from the SEQ Regional Plan 2009-2031 (the Plan) as a proxy for growth in connection numbers. The Plan provides a dwelling projection for 2031 for each LGA[9] and the starting point is the number of dwellings in 2006.

The Plan indicates that an additional 754 000 dwellings will be required by 2031 in order to accommodate SEQ's growing population. The allocations of the extra dwelling are based on government preferred settlement pattern principles. This includes, among other things, relieving pressures on the Coasts and redistributing growth to the Western Corridor. The plan's projections are explicitly based on government policy outcomes and targets such as preferred growth patterns rather

[9] There was a single dwelling projection for the Western regional LGAs (comprising Lockyer Valley, Scenic Rim and Somerset). As such, Frontier was only able to derive a single growth rate derived from that projection for each of those three LGAs i.e. 2.81% in Box 2 for those three LGAs.

than actual forecasts which capture historical trends. Another possible alternative source of data is the forecasts generated by the Water Grid Manager. However, at the time that this review was undertaken these forecasts were not available for consideration.

The PIFU projections of dwellings have been determined by the assumed propensity for living arrangements, number of people in each age and sex group, and the medium-series projected population analysis conducted in 2008. Unlike the Plan, the PIFU projections capture historical data and are arguably more robust as they are to 2016 (not 2031) and are therefore a better match to the 2013 interim price monitoring period. Frontier remains of the view that the PIFU growth rates are the most reliable third party estimates of household and thus connections growth.

PIFU distinguishes between average household size and occupancy rate. Household size refers to the number of people in each residential household while occupancy rate refers to number of people divided by total private dwellings. The businesses have opted to use the occupancy rates, which is consistent with good forecast practice as the connection numbers are driven by total private dwelling numbers and not residential households.

The businesses use equivalent population (EP) over equivalent tenements (ETs) to determine the occupancy rate for each region. QUU employs a different number of EPs for three types of residences and comes up with a weighted average described in Table 5 below.

Table 5: Residential occupancy rates by LGA.

LGA	Occupancy rate
Brisbane	2.4
Ipswich	2.6
Scenic Rim	2.6
Lockyer Valley	2.6
Sommerset	2.6
Gold Coast	2.3
Logan	2.8
Redland	2.6
Moreton Bay	2.7 to 2.6
Sunshine Coast	2.3

Source: Businesses' response to draft report

Queensland Urban Utilities derives equivalent population (EP) projections from local government population and employment projections. These relate only to the serviced population, and take into account the relative demands of different development types, such as high density residential, industrial and commercial, compared to low density residential. Industrial development and population densities will increase at different rates across Queensland Urban Utilities' service area. It then determines the number of EPs per equivalent tenement (ET) to derive the occupancy rates. Unitywater adopts the same approach. Allconnex Water uses the PIFU occupancy rates for 2011 across the 2011-2013 forecasting period.

Frontier remains of the view that the PIFU growth rates are the most appropriate external benchmark for the businesses forecast growth in customer numbers.

Recommendations

Frontier recommends the PIFU growth rates as the most appropriate external benchmark for the businesses forecast growth in customer numbers

4 Allconnex Water

This chapter presents Frontier's more detailed analysis of the proposed demand forecasts for Allconnex Water.

4.1 Proposed demand forecasts

Allconnex has forecast the following over the period July 2010 to June 2013[10]:

- Residential customer connections are forecast to grow from 357,309 in 2009-10 to 380,213 in 2012-13, representing an annual compounding growth rate of approximately 2.1 percent per annum.
- Residential wastewater connections are forecast to grow from 324,128 in 2009-2010 to 345,123 in 2012-13 representing an annual compounding growth rate of approximately 2.1 percent per annum.
- Non-residential customer connections for water are forecast to grow from 34,192 in 2009-10 to 37,558 in 2012-13, representing an annual compounding growth rate of approximately 2.5 percent per annum.
- Non-residential waste- water connections are forecast to grow from 21,583 in 2009-2010 to 23,227 in 2012-13, representing an annual growth compounding growth rate of approximately 2.5 percent per annum.
- Total water volumes (residential and non-residential) are forecast to grow from 81,800.868 ML in 2009-10 to 89,989.61 ML in 2012-13, representing an annual compounding growth rate of approximately 3.2 percent per annum.
- Residential sewage volumes were not available for Allconnex Water. There is only an access (and no volumetric) fee for sewerage. Allconnex Water did not include residential sewage volumes for that reason.
- Trade waste volume data were not provided.
- Recycled water volume data were only provided for 2009.

10 The forecasts for July 2010 to June 2013 shall be described on an annual basis, the years being 2011, 2012 and 2013.

4.2 Connections

Frontier has compared Allconnex's forecasted growth in residential connections with PIFU forecasted growth of dwellings and with historical data on connections obtained for local government areas from the Queensland Water Commission (see Table 6).

Table 6: Residential growth rates (%).

LGA	Allconnex 2010-13 (Connections)	PIFU 2006-16 (Dwellings)	QWC 2008-10 (Connections)
Gold Coast	2.3	3.0	0.7
Logan	2.2	2.4	3.2
Redland	1.4	2.4	1.7

Source: Frontier estimates based on Allconnex submission, PIFU forecasts and QWC historical data.

Notes: growth rates reported above are the annual average compound rates. The Allconnex growth rates are based on the three year period and include the base year 2010.

For residential connection numbers, Allconnex applies the PIFU growth rates for dwellings to produce the forecasts for 2011 to 2013. However, it has reduced the growth rate for Gold Coast in light of their historical data showing lower growth trends, and has applied a 1 percent growth rate to its Redland connection forecasts in line with Redland City Council's development policies[11].

Owing to differences between the Allconnex and PIFU data periods, Table 6 does not allow us to directly compare Allconnex's connections projections with PIFU's dwelling projections for the Allconnex forecast period (2010-13). However, it is worth noting that the PIFU growth rates for the period 2006-16 (which includes the 2010-13 period under consideration) are higher than those proposed by Allconnex.

The historical connection numbers based on QWC data indicate that connections growth prior to 2010 was slow relative to forecast growth for the Gold Coast but fast relative to forecast growth for Logan and Redland. To achieve the PIFU projections for the period 2006-16 (which includes some history) would imply a growth rate of dwellings for the period 2010-16 in excess of 3% for the Gold Coast, smaller than 2.4% for Logan and in excess of 2.4% for Redland.

11 Allconnex requested that the Redland City Council provide them with the document describing the 1% growth rate but the Council has not provided at this point in time.

In addition, especially if our inference about the PIFU numbers is correct, the table shows that Allconnex is projecting growth of connections over the period 2010-13 that is slower than PIFU projections of dwelling growth for the period 2010-16 in the Gold Coast and Redland but probably about equal to PIFU projections in Logan. We note that a possible explanation for this is that PIFU expects household growth to be faster in the period post 2013 than in the period 2010-13 for the Gold Coast and Redland.

Based on both PIFU forecasts and historical growth trends, the growth rates for residential connections proposed by Allconnex appear to be conservatively low relative to external estimates (the exception being QWC historical growth for the Gold Coast).

As part of the findings of the draft report Frontier recommended that growth rates based on PIFU forecasts of household connections be adopted. These forecasts differ from the historical trend, but we were mindful that the historical trend is based on a relatively short time period of two years and may be less reliable given structural changes in local government areas.

In response to the draft report Allconnex stated that its forecasts were based on PIFU 2008 projections and that future demand projections will have reference to more recent information such as the PIFU 2010 projections used by Frontier (based on a 10-year horizon from 2006-2016).

Frontier also noted in the draft report that it was unclear how Allconnex derived non-residential growth in connections. Subsequently Frontier did not amend these connection forecasts for the draft report. In response to the draft Allconnex stated that both the Gold Coast and Logan non-residential property forecasts were based on PIFU 2008 medium series population growth, with adjustments in certain instances. For example, a lower growth rate was applied by Gold Coast in 2010-11 to account for the impacts of the Global Financial Crisis.

Recommendations

After consideration of the further information provided by Allconnex Frontier recommends that water and wastewater residential connection numbers be adjusted accordingly to reflect the PIFU 2010 growth rates for dwellings.

4.3 Water volumes

Allconnex have used a number of assumptions regarding per person per day usage to develop their consumption forecasts. These assumptions include:

- Gold Coast — 215 litres per day (L/p/d) for 2011, and 210 L/p/d for 2012 and 2013.
- Logan — 190 L/p/d for 2011, and 200 L/p/d for 2012 and 2013.

- Redland — 200 L/p/d for 2011-2013.

Allconnex forecasts residential volumes for each LGA in the following manner. For 2011, it multiplies the forecast per person daily consumption (which is then annualised) by the PIFU projected medium series population in 2011. PIFU provides a medium-series population forecast for 2011 and 2016. Allconnex determines the compounded annual growth rate for that five-year period and applies it to their population forecasts for 2012 and 2013.

In the draft report Frontier noted that the SEQ Water Strategy target has been used for the Logan and Redland forecasts but not for the Gold Coast forecasts. In response to the draft report Allconnex stated that the targets were adopted on the basis that they were not materially different from the historical levels of consumption and are also for an interim period.

Allconnex have proposed variable growth rates for volumes across customer groups and across different billing areas (see Table 7). The table shows a considerable drop in growth rates compared to historical trends.

Table 7: Allconnex, growth rates for volume forecasts, water

Billing area	Customer type	Allconnex Proposed growth % 2010-13	QWC Historical growth % 2008-2010
Gold Coast	Residential	2.6	10.5
	Non-residential	2.2	3.4
Logan	Residential	7.0	9.1
	Non-residential	-1.9	4.2
Redland	Residential	3.0	6.8
	Non-residential	7.6	8.3

Source: Frontier estimates based on Allconnex submission to SEQ Interim price monitoring 2011 and data provided by QWC.

Note Growth rates are the average annual compound rate for the period under consideration. QWC data is for ML/d.

The observed fall in volume growth rates is consistent with expectations given the history of water demand restrictions. The historical period 2008-10 captures a period of rapid easing of demand restrictions and subsequently growth rates for this period may include high levels of bounceback. For the period 2011-13 restrictions are being held constant at a relatively low level (being PWCMs), and we would expect 'bounceback' to be less pronounced.

How quickly customers return to consumption patterns and levels that were prevalent prior to restrictions coming into effect will influence the rate of growth in water demand over the period. In the absence of robust historical data that captures periods prior to the implementation of restrictions it is difficult to assess whether Allconnex's forecasts adequately account for bounceback.

We note that on a per connection basis the Allconnex forecasts show a number of differing trends as evidenced in Table 8 below. For the Gold Coast, per connection consumption is forecast to fall over the period. For Logan, per connection consumption is forecast to increases in 2012 and then decreases in 2013. For Redland, per connection consumption is relatively constant over the period. The forecasts do not appear to be consistent with gradual bounceback.

Table 8: Allconnex, residential water per connection consumption kL.

Billing area	2011	2012	2013
Gold Coast	191.21	187.22	186.69
Logan	189.19	200.03	199.82
Redland	180.33	180.80	180.62

Source: Frontier estimates based on Allconnex submission Annual residential consumption divided by number of connections of that year

Given an absence of reliable historical data (extending back to pre-restriction years), Frontier was unable to ascertain how assumptions regarding 'bounceback' had been incorporated in the forecasts.

In response to the draft report Allconnex indicated that the council forecasts it had adopted as an interim measure did incorporate an element of bounceback. Allconnex provided the example of drought restrictions in its largest LGA Gold Coast were eased in 2008 and initially water consumption lifted only slightly. However, following a period of dry weather in 2009 water consumption increased significantly.

In relation to price elasticity of demand, we note that Allconnex has not employed elasticity in its demand forecasts. While Frontier considers price elasticity of demand to be relevant given the relative easing of restriction levels and the proposal by Allconnex to material increase some volumetric prices, we are mindful that Allconnex has not provided a price path for the three year period and that subsequently elasticity cannot be applied.

Recommendations

Frontier recommends that Allconnex's projected volumes be adjusted to account for amended connection numbers.

Frontier has not applied any elasticity estimates to volumes.

4.4 Wastewater

Wastewater volumes for residential customers are not relevant to prices because Allconnex's wastewater charges are fixed charges per connection, not volumetrically-based. As for non-residential customers, wastewater volumes were only provided for Gold Coast non-residential customers. These non-residential volumes are forecast to grow by an annual compounding rate of 2.6%. However, Allconnex's supporting documentation indicates it assumed a 1.7% average annual increase in wastewater volumes from 2010-2011 to 2014-15.

In the draft report Frontier stated that given that only data for the Gold Coast was available, it is not possible to assess the veracity of this assumption.

In response to the draft decision Allconnex has indicated that the Councils' forecasts for residential wastewater volumes are:

- 92% of total billable water consumption in the Gold Coast;
- 96% of total billable water consumption in Logan; and
- 89.7% of total billable water consumption in Redland.

Non-residential customer volumes are determined through the application of an industry based discharge factor or by a meter (where possible). The discharge factors for each industry type have been developed by Allconnex Water.

Recommendations

Frontier notes that wastewater volumes are important for long-term forecasting which is used to inform capital planning budgets. On this basis, Frontier recommends keeping records of both residential and non-residential wastewater volume flows.

4.5 Trade waste

No data were provided and Allconnex has explained why they were not provided. Allconnex stated in response to Frontier's initial RFI:

> "The Gold Coast district currently does not charge "volume charges" for trade waste, but rather quality charges, which apply where wastewater discharged from a property is over and above strengths described in the wastewater admission standards. The template reflects that Gold Coast has previously estimated that 30 % of volumetric wastewater revenues are attributable to trade waste customers; however this estimate has not been recently reviewed".

Allconnex also stated:

> "Logan currently has many charges that encompass trade waste - including a fixed generator charge, fixed fee treatment charges, volume charges, and quality based charges. Due to the many items included in the trade waste revenue in the template, volume information related to revenue is unable to be extracted at this stage".

A similar response was made for the Redland LGA. In the absence of any forecasts Frontier is unable to provide an assessment. Allconnex has indicated it will consider this issue as part of its ongoing business planning and improvement program.

Recommendations

Going forward, Frontier recommends Allconnex keep volumetric records for trade waste customers in the Logan and Redland areas. In the event that Allconnex extends volumetric trade waste charges to Gold Coast customers, it should also keep volumetric records the Gold Coast.

4.6 Recycled water

The data available for the review was not sufficient for Frontier to make an assessment. Allconnex provided a broad forecast of 95 ML per annum of Class A+ for Gold Coast recycled water but did not indicate for which time period the forecast applied. No forecasts were provided for Logan. The Redland forecast was 2.96 ML per annum but Allconnex also did not indicate for which time period it applied.

Allconnex has indicated that it will consider this issue as part of its ongoing business planning and improvement program. As a new entity, Allconnex is still developing its recycled water distribution capabilities and its pricing policies for the different classes of recycled water.

Recommendations

Going forward, Frontier advises Allconnex to keep volumetric records for all recycled water sold.

4.7 Long and short-term demand forecasts

Part of Frontier's brief is to assess the consistency between long-term demand forecasts used for capital planning and the short-term demand forecasts that underlie Allconnex's immediate pricing decision for the three year period under consideration.

From its consultation with Allconnex, Frontier understands that Allconnex treats both short-term demand forecasting and long-term demand forecasting as separate and unrelated undertakings. Specifically it adopts a number of different assumptions between the two, the most important being that it assumes a higher per person per day consumption level for long-term forecasting than it does for short-term forecasting.

For example, Allconnex assumes[12] a consumption figure of 620 L/ET/day for detached dwellings and 674 L/ET/day for attached dwellings in the Gold Coast for their infrastructure planning process. Its long-term forecasting is a more complex process that involves more input from water engineers and network planners. The process is different from how Allconnex forecasts their demand for revenue (short-term forecasts).

In response to the draft report Allconnex stated that long-term forecasting for planning includes the water consumption for which Allconnex does not collect fees. Examples include water lost in leakages in the reticulation network and water used for fire-fighting. Such water not accounted for in short-term forecasts is known as non-revenue water. The long-term forecasts would necessarily be higher than those of short-term forecasts.

Frontier considers that demand should be broadly consistent between short and long-term forecasts. By consistency Frontier does not mean to imply that the forecasts should be exactly the same; the forecasts should be broadly similar once all the meaningful differences between the two series are accounted for. Although the forecasts are undertaken for different purposes the primary objective should always be to develop the most realistic set of forecasts based on the best available data and future expectations.

Where there is a need to consider peak demand or supply security, such considerations should be made explicit and transparent through either separate demand forecasts in the case of peak demand or through a separate planning mechanism (such as storage management or contingency planning like a security of supply buffer held in storage).

Recommendations

Frontier recommends Allconnex review its methodology as part of its ongoing business planning and improvement program.

4.8 Revised forecasts

In amending Allconnex's proposed forecasts Frontier made the following adjustments consistent with the recommendations above (see Table 9):

- Connection forecasts for residential water customers were amended to reflect growth rates based on PIFU dwelling projections.
- The PIFU dwelling growth rates were also applied to residential waste-water customers

12 The Gold Coast Priority Infrastructure Plan highlights the relevant figures. There are different figures for different cases. Refer to pages 27-28 of Supporting Document 26a of Allconnex Water's submission to QCA for more details about the different cases.

Table 9: Proposed and amended demand forecasts

Tariff	Parameter	Area	Service	Customer	Tariff Description	Unit	Sum of FY2010	Sum of FY2011	Sum of FY2012	Sum of FY2013
1	Quantity	Gold Coast	Drinking water	Residential	Residential Fixed	No. of properties	211,943.6	214,189.0	220,292.1	226,583.4
	Amended Quantity	Gold Coast	Drinking water	Residential	Residential Fixed	No. of properties	211,943.6	218,252.9	224,750.0	231,440.5
	Final Amended Quantity	Gold Coast	Drinking water	Residential	Residential Fixed	No. of properties	211,943.6	218,244.5	220,556.6	226,841.1
2	Quantity	Gold Coast	Drinking water	Residential	Residential Volumetric	ML/a	39,144.0	40,954.9	41,242.4	42,300.2
	Amended Quantity	Gold Coast	Drinking water	Residential	Residential Volumetric	ML/a	39,144.0	41,096.5	41,436.3	42,549.0
	Final Amended Quantity	Gold Coast	Drinking water	Residential	Residential Volumetric	ML/a	39,144.0	41,730.4	41,291.9	42,348.3
3	Quantity	Gold Coast	Drinking water	Business	Commercial Fixed Charges	No. of properties	10,472.4	10,792.2	11,069.9	11,354.7
4	Quantity	Gold Coast	Drinking water	Business	Commercial Volumetric	ML/a	5,448.0	6,239.0	6,361.0	6,486.0
5	Quantity	Gold Coast	Drinking water	Business	Small Industrial Fixed	No. of properties	5,051.0	5,205.3	5,339.2	5,476.6
6	Quantity	Gold Coast	Drinking water	Business	Small Industrial Volumetric	ML/a	2,683.0	2,334.0	2,394.1	2,455.6
7	Quantity	Gold Coast	Drinking water	Business	Large Industrial Fixed	No. of properties	22.3	22.7	23.0	23.3
8	Quantity	Gold Coast	Drinking water	Business	Large Industrial Volumetric	ML/a	3,640.0	3,640.0	3,640.0	3,640.0
9	Quantity	Gold Coast	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	199,300.0	201,000.3	206,810.4	212,801.8
	Amended Quantity	Gold Coast	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	199,300.0	205,232.9	206,983.8	212,966.9
	Final Amended Quantity	Gold Coast	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	199,300.0	205,225.0	206,975.8	212,958.6
10	Quantity	Gold Coast	Waste-water via Sewer	Business	Non-residential Fixed Charges	No. of properties	14,785.7	15,300.0	15,629.3	16,031.4
11	Quantity	Gold Coast	Waste-water via Sewer	Business	Non-residential Pedestal Charges	No. of Pedestals	0.0	0.0	0.0	0.0

12	Quantity	Gold Coast	Waste-water via Sewer	Business	Non-residential Volumetric Charges	ML/a	6,769.0	7,200.0	7,116.4	7,301.5
15	Quantity	Logan	Drinking water	Residential	Residential Fixed	No. of properties	89,032.0	90,928.0	92,901.1	94,917.1
	Amended Quantity	Logan	Drinking water	Residential	Residential Fixed	No. of properties	89,032.0	91,819.3	94,693.8	97,658.4
	Final Amended Quantity	Logan	Drinking water	Residential	Residential Fixed	No. of properties	89,032.0	91,173.1	94,027.4	96,971.1
16	Quantity	Logan	Drinking water	Residential	Residential Volumetric	ML/a	15,487.0	17,203.0	18,583.0	18,965.9
	Amended Quantity	Logan	Drinking water	Residential	Residential Volumetric	ML/a	15,487.0	17,121.5	18,668.8	19,232.6
	Final Amended Quantity	Logan	Drinking water	Residential	Residential Volumetric	ML/a	15,487.0	17,249.4	18,808.3	19,376.3
17	Quantity	Logan	Drinking water	Business	Commercial Fixed Charges	No. of properties	17,738.0	18,309.0	18,655.0	19,007.6
18	Quantity	Logan	Drinking water	Business	Commercial Volumetric	ML/a	3,752.0	3,312.0	3,411.0	3,513.0
19	Quantity	Logan	Drinking water	Business	Small Industrial Fixed	No. of properties	0.0	0.0	0.0	0.0
20	Quantity	Logan	Drinking water	Business	Small Industrial Volumetric	ML/a	130.0	150.0	153.0	156.1
21	Quantity	Logan	Drinking water	Business	Large Industrial Fixed	No. of properties	0.0	0.0	0.0	0.0
22	Quantity	Logan	Drinking water	Business	Large Industrial Volumetric	ML/a	0.0	0.0	0.0	0.0
23	Quantity	Logan	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	76,883.0	78,548.0	80,386.0	82,266.0
	Amended Quantity	Logan	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	76,883.0	79,289.9	81,007.1	82,902.6
	Final Amended Quantity	Logan	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	76,883.0	78,732.0	80,437.0	82,319.2
24	Quantity	Logan	Waste-water via Sewer	Business	Non-residential Fixed Charges	No. of properties	4,990.0	5,089.0	5,201.0	5,315.0
25	Quantity	Logan	Waste-water via Sewer	Business	Non-residential Pedestal Charges	No. of Pedestals	0.0	0.0	0.0	0.0
26	Quantity	Logan	Waste-water via Sewer	Business	Non-residential Volumetric Charges	ML/a	0.0	0.0	0.0	0.0
29	Quantity	Redland	Drinking water	Residential	Residential Fixed	No. of properties	56,333.0	57,556.0	58,132.0	58,713.0
	Amended	Redland	Drinking water	Residential	Residential Fixed	No. of	56,333.0	57,712.3	59,125.4	60,573.1

	Quantity					properties				
	Final Amended Quantity	Redland	Drinking water	Residential	Residential Fixed	No. of properties	56,333.0	57,711.0	59,124.0	60,571.7
30	Quantity	Redland	Drinking water	Residential	Residential Volumetric	ML/a	10,016.9	10,379.1	10,510.2	10,604.8
	Amended Quantity	Redland	Drinking water	Residential	Residential Volumetric	ML/a	10,016.9	10,348.4	10,629.3	10,878.9
	Final Amended Quantity	Redland	Drinking water	Residential	Residential Volumetric	ML/a	10,016.9	10,407.0	10,689.5	10,940.5
31	Quantity	Redland	Drinking water	Business	Commercial Fixed Charges	No. of properties	1,628.0	1,662.0	1,679.0	1,696.0
32	Quantity	Redland	Drinking water	Business	Commercial Volumetric	ML/a	1,500.0	1,716.0	1,706.0	1,734.0
33	Quantity	Redland	Drinking water	Business	Small Industrial Fixed	No. of properties	0.0	0.0	0.0	0.0
34	Quantity	Redland	Drinking water	Business	Small Industrial Volumetric	ML/a	0.0	131.5	132.8	134.1
35	Quantity	Redland	Drinking water	Business	Large Industrial Fixed	No. of properties	0.0	0.0	0.0	0.0
36	Quantity	Redland	Drinking water	Business	Large Industrial Volumetric	ML/a	0.0	0.0	0.0	0.0
37	Quantity	Redland	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	47,944.9	49,067.6	49,559.0	50,055.0
	Amended Quantity	Redland	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	47,944.9	49,118.8	50,269.1	50,772.5
	Final Amended Quantity	Redland	Waste-water via Sewer	Residential	Residential Fixed Charges	No. of properties	47,944.9	49,117.6	50,267.9	50,771.3
38	Quantity	Redland	Waste-water via Sewer	Business	Non-residential Fixed Charges	No. of properties	1,807.6	1,843.2	1,862.0	1,881.0
39	Quantity	Redland	Waste-water via Sewer	Business	Non-residential Pedestal Charges	No. of Pedestals	0.0	0.0	0.0	0.0
40	Quantity	Redland	Waste-water via Sewer	Business	Non-residential Volumetric Charges	ML/a	0.0	0.0	0.0	0.0

5 Queensland Urban Utilities (QUU)

This chapter presents Frontier's more detailed analysis of the proposed demand forecasts for QUU.

5.1 Proposed demand forecasts

QUU has forecast the following over the period July 2011 to June 2013:

- Residential customer connections for water are forecast to grow from 471,674 in 2010-11 to 481,310 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum.
- Residential wastewater connections are forecast to grow from 444,067 in 2010-11 to 453,059 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum. Residential pedestal numbers are forecast to grow from 1,869 in 2010-11 to 1,907 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum.
- Non-residential customer connections for water are forecast to grow from 38,163 in 2010-11 to 38,957 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum.
- Non-residential wastewater connections are forecast to grow from 30,039 in 2010-11 to 30,654 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum. Non-residential pedestal numbers are forecast to grow from 177,818 in 2010-11 to 181,422 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum.
- Total water volumes (residential and non-residential) are forecast to grow from 106,997.94 ML in 2010-11 to 113,518.43 ML in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately three percent per annum.
- Non-residential trade waste volumes are forecast to grow from 9,973 in 2010-11 to 10,173.46 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum. Trade waste customer connections for water are forecast to grow from 1220 in 2010-11 to 1245 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum.

- Recycled waste volumes are forecast to grow from 6,731ML in 2010-11 to 6,866 ML in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately one percent per annum.

5.2 Connections

QUU has forecast relatively low growth rates in connections over the three year period. These growth rates are not directly comparable with other businesses as (with the exception of water connections for Brisbane) QUU only provided demand forecasts for the three years and did not provide actual data for 2009 or 2010. Subsequently, growth estimates do not include change in demand for 2011.

In its draft report Frontier compared the proposed growth in residential connections with PIFU forecast growth of dwellings and with historical trends based on data obtained for local government areas from the Queensland Water Commission. These comparisons are reported in Table 10.

Table 10: Residential growth rates (%).

LGA	QUU 2010-13 (Connections)	PIFU 2006-16 (Dwellings)	QWC 2008-10 (Connections)
Brisbane	1.0	1.6	2.9
Ipswich	1.0	4.5	3.0
Lockyer	1.0	3.1	3.5
Somerset	1.5	2.6	4.8
Scenic Rim	1.5	2.9	3.8

Source: Frontier estimates based on QUU submission, PIFU forecasts and QWC historical data.

Notes: growth rates reported above are the annual average compound rates. The majority of QUU growth rates are based on the three year period and exclude the base year 2010. The exception is Brisbane, which QUU provided data for 2010 allowing a growth rate based on the full period to be calculated. Historical growth estimates are based on the three year period 2008-10 to avoid structural change in LGA boundaries with Esk and Kilcoy becoming Somerset, Gatton and Laidley becoming Lockyer and Beaudesert and Boonah becoming Scenic Rim. QUU provided an actual number of connections for 2010 in its submission to the QCA but Frontier has not used this value in the Final report because it did not match the figures provided on the 7th of October 2010 in response to Frontier's Draft report. Frontier has since used the most recently provided figures.

Based on both PIFU forecasts and historical growth trends the growth rates for residential connections proposed by QUU appear to be conservative. In the absence of historical data provided by QUU Frontier recommended that growth rates based on PIFU forecasts of dwellings be adopted. These forecast growth rates are lower than is evidenced by the historical trend, but we are mindful that

the historical trend is based on a relatively short time period of two years and may be less reliable given the structural changes in local government areas.

Given that QUU appear to have applied residential growth numbers to both non-residential customers and wastewater customers, in the absence of more robust information we adopted the same approach in the draft report. However, we do note (as we did in the draft report) that historical data for non-residential connections over the same period indicate a degree of variance between the two series.

In response to the draft report QUU stated that it used the growth rates outlined in Table 11 to determine connections in 2010-11.

Table 11: QUU property growth rates 2010-11

	Brisbane	Ipswich	Lockyer Valley	Scenic Rim	Somerset
Residential Water	1.55%	3.6%	3.3%	1.6%	1.6%
Non-res Water	1.00%	0% [1]	1.4%	1.0%	1.0%
Residential – Wastewater	1.55%	3.6%	3.3%	1.6%	1.6%
Non-res Wastewater	1.00%	0%[1]	1.4%	1.0%	1.0%

Source: QUU response to draft report.

QUU indicated that the zero growth rate for Ipswich non-residential customers represented potential loss of large commercial customers. The property growth rates in table 11 were applied against property counts derived from billing data supplied by the Council operated water businesses.

QUU has advised Frontier that the 1% growth rate in connections observable over the three year period for the 5 LGAs has not been used to determine prices in the 2012 and 2013 financial year. QUU has indicated that the quantities reported in the information templates provided to QCA do not represent demand forecasts. Rather, these quantities reflect a blanket growth assumption based on forecast revenue.

QUU provided Frontier with billing statistics for the July-September 2010 quarter. Frontier took the number of residential accounts for water and wastewater provided by QUU as Quarter 1 of FY 2011 figures and produced a

forecast[13] for 2011 for the five LGAs based on the relevant PIFU annualised growth rates in Table 10. Frontier then applied those growth rates to forecast the connection numbers for 2012 and 2013.

For this final report Frontier has not amended non-residential customer connections given the response from QUU that the 1 per cent growth rate is a reflection of the business's revenue expectations. However, we do recommend going forward that QUU revise its non-residential projections.

Recommendations

In consideration of QUU's response, Frontier recommends that the PIFU growth rates be applied to the 2010-11 connections for residential connections.

Frontier recommends non-residential connections are amended to reflect anticipated demand over the period. However, Frontier does not have adequate information to make such amendments.

5.3 Water volumes

QUU have used a number of assumptions regarding per person per day usage to develop their consumption forecasts. These assumptions include:

- Brisbane and Ipswich — 175 L/p/d for 2011, 180 L/p/d for 2012 and 185 L/p/d for 2013.
- Lockyer Valley, Somerset and Scenic Rim — 157.5 L/p/d for 2011, 162 L/p/d for 2012 and 166.5 L/p/d for 2013.

QUU have accounted for bounceback in these underlying assumptions for their volume forecasts. QUU have proposed variable growth rates for volumes across customer groups and across different billing areas (see Table 12). The table shows a considerable drop in growth rates compared to historical trends.

The observed fall in volume growth rates is consistent with expectations given the history of water demand restrictions. The historical period 2008-10 captures a period of rapid easing of demand restrictions and subsequently growth rates for this period may include high levels of bounceback. For the period 2011-13 restrictions are being held constant at a relatively low level (being PWCMs), and we would expect bounceback to be less pronounced.[14]

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[13] $Connections_{2011} = \frac{1+PIFU\ annualised\ growth\ rate}{1+PIFU\ annualised\ growth\ rate/4} \times Connections_{Quarter\ 1,2011}$

[14] The concept of bounceback refers to an increase in consumption following the lifting of water use restrictions. It is reasonable to expect that as restrictions are eased consumption will return (if not fully then partially) to levels similar to pre-restriction consumption. This return to pre-restriction consumption levels is generally referred to as 'bounceback'.

How quickly customers return to consumption patterns and levels that were prevalent prior to restrictions coming into effect will influence the rate of growth in water demand over the period.

Table 12: Growth rates for water volume forecasts (%)

Billing area	Customer type	QUU Proposed growth 2011-13	QWC Historical growth 2008-2010
Brisbane	Residential	3.6	7.8
	Non-residential	1.3	10.0
Ipswich	Residential	3.8	10.9
	Non-residential	1.0	0.7
Lockyer	Residential	3.8	21.8
	Non-residential	1.0	14.9
Somerset	Residential	4.4	10.0
	Non-residential	1.5	-1.3
Scenic Rim	Residential	4.4	16.8
	Non-residential	1.5	4.5

Source: Frontier estimates based on QUU submission to SEQ Interim price monitoring 2011 and data provided by QWC.

Note Growth rates are the average annual compound rate for the period under consideration. QWC data is for ML/d.

We note that on a per connection basis the QUU forecasts are increasing over the period which is consistent with gradual bounceback (see Table 13). We also note that the relatively low level of increase per connection is consistent with the continued easing of restrictions to the level of PWCMs.

Given the consistency of QUU's forecast trends with Frontier's expectations we accept that the per connection levels of consumption proposed by QUU over the forthcoming period adequately reflect bounceback.

Table 13: Per connection consumption, residential water (kLs).

Billing area	2011	2012	2013
Brisbane	150.76	155.06	159.37
Ipswich	162.13	166.76	171.39
Lockyer	104.81	107.80	110.80
Somerset	143.72	147.83	151.93
Scenic Rim	143.72	147.83	151.93

Source: Frontier estimates based on QUU submission Frontier divided residential volumes for each district by residential connections to derive estimates. The volume and connections numbers for this calculation were based on QUU's submitted numbers

In relation to price elasticity of demand, we note that QUU has not employed elasticity in its demand forecasts. While Frontier considers price elasticity of demand to be relevant given the relative easing of restriction levels and the proposal by QUU to material increase some volumetric prices, we are mindful that QUU has not provided a price path for the three year period and that subsequently elasticity cannot be applied to the demand forecasts.

Recommendations

QUU's assumption about per person daily consumption is consistent with bounceback. Frontier has accepted these figures.

Frontier recommends QUU's forecast residential volumes be amended to reflect the amended growth rates for connections.

Frontier has not adjusted QUU's demand forecasts to account for price elasticity of demand.

Frontier has not adjusted QUU's non-residential customer volumes.

5.4 Wastewater

Wastewater connections have been adjusted to reflect the same growth rate as water connections, as per the approach proposed by QUU.

QUU is not proposing to introduce volumetric charges for wastewater. Consequently, there is no requirement for QUU to produce wastewater volumetric forecasts.

Recommendation

Frontier recommends that residential wastewater connections be amended to reflect the PIFU growth rates as per residential water connections.

5.5 Trade waste

In its draft report Frontier noted that QUU is forecasting trade waste connections over the three periods to grow from 1220 to 1245. The annual compound growth rate of one percent per annum is consistent with the growth rate assumed for residential and non-residential connections for wastewater and connections for residential and non-residential water customers.

Frontier does not consider it appropriate to apply a blanket assumption regarding growth rates for different services. Ideally demand forecasts associated with each should reflect the historical trends specific to that service and any expectations regarding future events that impact specifically on that service.

Unlike water connections, Frontier was unable to obtain historical data from any alternative sources such as QWC. While we believe that the growth rate proposed is not appropriate, we do not have access to the data needed to generate an alternative estimate.

In addition we do not expect there to be any correlation between water customer numbers and trade waste customer numbers. Subsequently we believe it would be inappropriate to simply apply the amended growth rates from water customers to the trade waste forecasts.

In the draft report we did not amend QUU's trade waste connection forecasts but suggested that in response to the draft report QUU provide historical data supporting their proposal.

QUU has adopted a similar approach to forecasting trade waste volumes as it did for forecasting trade waste connections. It has assumed a one percent per annum average compounding growth rate over the three year period.

As with connections we believe this forecast should be made to better reflect historical trends and future expectations specific to trade waste. However in the absence of the necessary data we are unable to develop an alternative forecast. In response to this report QUU should provide historical evidence supporting its proposal.

In response to the draft report QUU stated that the quantities reported to QCA did not constitute demand forecasts for any year other than 2010-11. As stated earlier QUU indicated that they were in effect revenue forecasts.

Recommendation

Frontier has not amended QUU's trade waste connection forecasts but suggests that subsequent to the SEQ Interim Price Monitoring process QUU considers developing short-term demand forecasts for trade waste customers.

5.6 Recycled water

QUU have provided forecasts for recycled water volumes for both Brisbane and Ipswich. It appears QUU have adopted a blanket growth assumption of one percent per annum over both sets of forecasts (see Table 14). Ideally individual forecasts should reference circumstances specific to the service under consideration.

In the absence of historical data or alternative sources of data, Frontier is unable to provide alternative forecasts to those proposed by QUU.

Table 14: Recycled water volumes and growth rates

Area	2011	2012	2013	% annual growth
Brisbane	6,615	6,681	6,748	1.0
Ipswich	116	117	118	1.0

Source: Frontier estimates based on QUU submission.

Recommendations

Frontier has not amended QUU's recycled water forecasts.

5.7 Long and short-term demand forecasts

Part of Frontier's brief is to assess the consistency between long-term demand forecasts used for capital planning and the short-term demand forecasts that underlie QUU's immediate pricing decision for the three year period under consideration. From its consultation with QUU Frontier understands that QUU treats both short-term demand forecasting and long-term demand forecasting as separate undertakings.

In the draft report we stated that Frontier considers that demand should be broadly consistent between both short and long-term forecasts. By consistency Frontier does not mean to imply that the forecasts should be exactly the same. The meaning of the statement is that they should be broadly similar once all the meaningful differences between the two series are accounted for. Although the forecasts are undertaken for different purposes the primary objective should always be to develop the most realistic set of forecasts based on the best available data and future expectations.

Where there is a need to consider peak demand or supply security, such considerations should be made explicit and transparent through either separate demand forecasts in the case of peak demand or through a separate planning

mechanism (such as storage management or contingency planning like a security of supply buffer held in storage).

In response to the draft report QUU stated that there appeared to be some misunderstandings in regards to the interaction of short-term demand forecasting, for the purpose of pricing and operating costs, and long-term demand forecasting, used for the purpose of capital planning. QUU stated that it did address short term and long-term demand forecasting separately but they are not unrelated undertakings. QUU stated:

> Both sets of forecasts take fundamentally similar approaches, by looking at historical trends and projecting forward considering official growth forecasts and anticipated water use behaviour trends. There will be some differences between the two due to somewhat mutually exclusive functions. For financial planning purposes, significant effort is invested into the short term forecasts to try and estimate anticipated volatility over the next 1 to 3 years.
>
> On the other hand, capital planning tends to be insensitive to short term consumption fluctuations. Instead, plans for capacity enhancing assets (themselves a subset of the capital plan) are driven by what the spatial distribution of network peak loads are projected to be in 2031-2051, and staging of the assets impacted by projected growth/demands 5-10 years from now. For this reason less effort is spent on the long term forecasts on trying to predict 1-3 year fluctuations and attention instead focussed on estimating spatial growth distributions (i.e. where growth is predicted to occur rather than just how much) and long-term/permanent water use behaviours that assets with 20-80 year lifespans must accommodate.

QUU also stated that its long-term demand planning framework had built in checks and balances in order to ensure appropriate demand forecasts were used:

> Queensland Urban Utilities has in-built checks and balances to make sure that we do not seek to over-capitalise:
>
> a) Any new network plans that are done use current demand forecasts, which are currently lower than previous.
>
> b) Capital items planned in the next five years undergoes extensive checks through feasibilities as to whether or not the trigger the commencement delivery mechanisms (ie. detailed planning, design and construction) for the planned. If there are growth / demand drivers for the asset(s) that have not materialised, then that item is deferred, scaled back and/or cancelled.

QUU also provided Frontier with the most recent version of its Water and Sewerage Planning Guidelines in response to the draft report. While these guidelines currently only refer to Brisbane, Frontier understands they have been adopted as default guidelines as an interim measure while the business reviews and updates them to accommodate the entire service area. QUU make two distinct observations regarding the guidelines:

1. The planning parameters used to develop QUU's infrastructure plans (capital infrastructure programs) have been revised from the previous version of the Guidelines (lowered to reflect trends moving forward)

2. The key planning parameters used to design/size QUU's network infrastructure are:
    a. Water: peak hour and maximum day; and
    b. Sewer: peak wet weather flow

Recommendations

Frontier accepts that the primary drivers for long-term demand forecasting and short-term forecasting differ as described by QUU.

5.8 Revised forecasts

In amending QUU's proposed forecasts Frontier made the following adjustments consistent with the recommendations above:

- Connection forecasts for residential customers were amended to reflect growth rates based on PIFU dwelling projections.
- Consistent with QUU's approach of adopting uniform growth rates, the PIFU dwelling growth rates were also applied to wastewater customers and non-residential customers.

The amended forecasts are outlined in Table 15.

Table 15: Proposed and amended demand forecasts

Tariff	Parameter	Area	Service	Customer	Tariff Description	Unit	Sum of FY2010	Sum of FY2011	Sum of FY2012
1	Quantity	Brisbane	Drinking water	Residential	Access charge	Properties	399,922.0	403,921.2	407,960.4
	Amended quantity	Brisbane	Drinking water	Residential	Access charge	Properties	410,052.5	416,613.4	423,279.2
	Final Amended quantity	Brisbane	Drinking water	Residential	Access charge	Properties	397,502.2	403,965.9	410,534.7
2	Quantity	Brisbane	Drinking water	Residential	Volume charge	MLs	60,290.5	62,633.2	65,016.8
	Amended quantity	Brisbane	Drinking water	Residential	Volume charge	MLs	61,136.4	63,889.3	66,714.6
	Final Amended quantity	Brisbane	Drinking water	Residential	Volume charge	MLs	59,925.7	62,640.1	65,427.0
3	Quantity	Brisbane	Drinking water	Business	Access charge	Properties	30,687.0	30,993.9	31,303.8
	Amended quantity	Brisbane	Drinking water	Business	Access charge	Properties	30,922.0	31,416.7	31,919.4
	Final Amended quantity	Brisbane	Drinking water	Business	Access charge	Properties	30,687.0	30,993.9	31,303.8
4	Quantity	Brisbane	Drinking water	Business	Volume charge	MLs	28,648.2	29,021.6	29,399.6
	Amended quantity	Brisbane	Drinking water	Business	Volume charge	MLs	28,867.5	29,417.5	29,977.8
	Final Amended quantity	Brisbane	Drinking water	Business	Volume charge	MLs	28,648.2	29,021.6	29,399.6
5	Quantity	Brisbane	Waste-water via Sewer	Residential	Access charge	Properties	389,215.0	393,107.2	397,038.2
	Amended quantity	Brisbane	Waste-water via Sewer	Residential	Access charge	Properties	389,215.0	395,442.4	401,769.5
	Final Amended quantity	Brisbane	Waste-water via Sewer	Residential	Access charge	Properties	390,486.0	396,835.6	403,288.5
6	Quantity	Brisbane	Waste-water via Sewer	Business	Access charge	Properties	28,959.0	29,248.6	29,541.1
	Amended quantity	Brisbane	Waste-water via Sewer	Business	Access charge	Properties	28,959.0	29,422.3	29,893.1
	Final Amended quantity	Brisbane	Waste-water via Sewer	Business	Access charge	Properties	28,959.0	29,248.6	29,541.1
7	Quantity	Brisbane	Waste-water via Sewer	Business	Pedestal charge	Pedestals	145,965.0	147,424.7	148,898.9
8	Quantity	Brisbane	Trade Waste	Business	Trade waste charge	Properties	812.0	820.1	828.3

9	Quantity	Brisbane	Trade Waste	Business	Trade waste content	Volume	9,529.0	9,624.3	9,720.5
10	Quantity	Brisbane	Other Core Waste-water Services	Business	Recycled water	Volume	6,615.0	6,681.2	6,748.0
11	Quantity	Ipswich	Drinking water	Residential	Access charge	Properties	61,482.0	62,096.8	62,717.8
	Amended quantity	Ipswich	Drinking water	Residential	Access charge	Properties	61,482.0	64,248.7	67,139.9
	Final Amended quantity	Ipswich	Drinking water	Residential	Access charge	Properties	62,788.1	65,634.3	68,609.5
12	Quantity	Ipswich	Drinking water	Residential	Volume charge	MLs	9,967.8	10,355.1	10,749.2
	Amended quantity	Ipswich	Drinking water	Residential	Volume charge	MLs	9,857.6	10,595.5	11,379.9
	Final Amended quantity	Ipswich	Drinking water	Residential	Volume charge	MLs	10,179.6	10,945.0	11,759.0
13	Quantity	Ipswich	Drinking water	Business	Access charge	Properties	4,217.0	4,259.2	4,301.8
	Amended quantity	Ipswich	Drinking water	Business	Access charge	Properties	4,217.0	4,406.8	4,605.1
	Final Amended quantity	Ipswich	Drinking water	Business	Access charge	Properties	4,217.0	4,259.2	4,301.8
14	Quantity	Ipswich	Drinking water	Business	Volume charge	MLs	5,813.0	5,871.1	5,929.8
	Amended quantity	Ipswich	Drinking water	Business	Volume charge	MLs	5,813.0	6,074.6	6,347.9
	Final Amended quantity	Ipswich	Drinking water	Business	Volume charge	MLs	5,813.0	5,871.1	5,929.8
15	Quantity	Ipswich	Waste-water via Sewer	Residential	Access charge	Properties	44,112.0	44,553.1	44,998.7
	Amended quantity	Ipswich	Waste-water via Sewer	Residential	Access charge	Properties	44,112.0	46,097.0	48,171.4
	Final Amended quantity	Ipswich	Waste-water via Sewer	Residential	Access charge	Properties	56,535.7	59,098.5	61,777.5
16	Quantity	Ipswich	Waste-water via Sewer	Business	Pedestal charges	Pedestals	28,920.0	29,209.2	29,501.3
17	Quantity	Ipswich	Trade Waste	Business	Trade waste	Properties	408.0	412.1	416.2
18	Quantity	Ipswich	Trade Waste	Business	Trade waste content	Volume	444.0	448.4	452.9
19	Quantity	Ipswich	Other Core Waste-water Services	Business	Recycled water	Volume	116.2	117.3	118.5
20	Quantity	Lockyer Valley	Drinking water	Residential	Access charge	Properties	10,172.0	10,273.7	10,376.4
	Amended quantity	Lockyer Valley	Drinking water	Residential	Access charge	Properties	10,172.0	10,487.3	10,812.4
	Final Amended quantity	Lockyer Valley	Drinking water	Residential	Access charge	Properties	10,012.7	10,325.9	10,648.8

21	Quantity	Lockyer Valley	Drinking water	Residential	Volume charge	MLs	1,066.1	1,107.5	1,149.7
	Amended quantity	Lockyer Valley	Drinking water	Residential	Volume charge	MLs	1,055.2	1,119.0	1,185.7
	Final Amended quantity	Lockyer Valley	Drinking water	Residential	Volume charge	MLs	1,049.4	1,113.2	1,179.9
22	Quantity	Lockyer Valley	Drinking water	Business	Access charge	Properties	531.0	536.3	541.7
	Amended quantity	Lockyer Valley	Drinking water	Business	Access charge	Properties	531.0	547.5	564.4
	Final Amended quantity	Lockyer Valley	Drinking water	Business	Access charge	Properties	531.0	536.3	541.7
23	Quantity	Lockyer Valley	Drinking water	Business	Volume charge	MLs	217.3	219.5	221.7
	Amended quantity	Lockyer Valley	Drinking water	Business	Volume charge	MLs	217.3	224.1	231.0
	Final Amended quantity	Lockyer Valley	Drinking water	Business	Volume charge	MLs	217.3	219.5	221.7
24	Quantity	Lockyer Valley	Waste-water via Sewer	Residential	Access charge	Properties	4,200.0	4,242.0	4,284.4
	Amended quantity	Lockyer Valley	Waste-water via Sewer	Residential	Access charge	Properties	4,200.0	4,330.2	4,464.4
	Final Amended quantity	Lockyer Valley	Waste-water via Sewer	Residential	Access charge	Properties	4,131.0	4,260.1	4,393.4
25	Quantity	Lockyer Valley	Waste-water via Sewer	Residential	Pedestal charges	Pedestals	1,869.0	1,887.7	1,906.6
26	Quantity	Scenic Rim	Drinking water	Residential	Access charge	Properties	5,025.0	5,100.4	5,176.9
	Amended quantity	Scenic Rim	Drinking water	Residential	Access charge	Properties	5,025.0	5,170.7	5,320.7
	Final Amended quantity	Scenic Rim	Drinking water	Residential	Access charge	Properties	5,852.1	6,019.5	6,191.7
27	Quantity	Scenic Rim	Drinking water	Residential	Volume charge	MLs	722.2	754.0	786.5
	Amended quantity	Scenic Rim	Drinking water	Residential	Volume charge	MLs	715.8	757.6	801.3
	Final Amended quantity	Scenic Rim	Drinking water	Residential	Volume charge	MLs	841.1	889.8	940.7
28	Quantity	Scenic Rim	Drinking water	Business	Access charge	Properties	2,210.0	2,243.2	2,276.8
	Amended quantity	Scenic Rim	Drinking water	Business	Access charge	Properties	2,210.0	2,274.1	2,340.0
	Final Amended quantity	Scenic Rim	Drinking water	Business	Access charge	Properties	2,210.0	2,243.2	2,276.8

29	Quantity	Scenic Rim	Drinking water	Business	Volume charge	MLs	256.0	259.8	263.7
	Amended quantity	Scenic Rim	Drinking water	Business	Volume charge	MLs	256.0	263.4	271.1
	Final Amended quantity	Scenic Rim	Drinking water	Business	Volume charge	MLs	256.0	259.8	263.7
30	Quantity	Scenic Rim	Waste-water via Sewer	Residential	Access charge	Properties	3,549.0	3,602.2	3,656.3
	Amended quantity	Scenic Rim	Waste-water via Sewer	Residential	Access charge	Properties	3,549.0	3,651.9	3,757.8
	Final Amended quantity	Scenic Rim	Waste-water via Sewer	Residential	Access charge	Properties	3,974.9	4,088.6	4,205.6
31	Quantity	Scenic Rim	Waste-water via Sewer	Business	Pedestal charges	Pedestals	2,933.0	2,977.0	3,021.6
32	Quantity	Somerset	Drinking water	Residential	Access charge	Properties	4,178.0	4,240.7	4,304.3
	Amended quantity	Somerset	Drinking water	Residential	Access charge	Properties	4,178.0	4,286.6	4,398.1
	Final Amended quantity	Somerset	Drinking water	Residential	Access charge	Properties	4,641.4	4,762.4	4,886.5
33	Quantity	Somerset	Drinking water	Residential	Volume charges	MLs	600.5	626.9	654.0
	Amended quantity	Somerset	Drinking water	Residential	Volume charges	MLs	594.8	627.7	661.9
	Final Amended quantity	Somerset	Drinking water	Residential	Volume charges	MLs	667.1	704.0	742.4
34	Quantity	Somerset	Drinking water	Business	Access charge	Properties	518.0	525.8	533.7
	Amended quantity	Somerset	Drinking water	Business	Access charge	Properties	518.0	531.5	545.3
	Final Amended quantity	Somerset	Drinking water	Business	Access charge	Properties	518.0	525.8	533.7
35	Quantity	Somerset	Drinking water	Business	Volume charges	MLs	482.5	489.7	497.0
	Amended quantity	Somerset	Drinking water	Business	Volume charges	MLs	482.5	495.0	507.9
	Final Amended quantity	Somerset	Drinking water	Business	Volume charges	MLs	482.5	489.7	497.0
36	Quantity	Somerset	Waste-water via Sewer	Residential	Sewerage charge	Billing units	2,991.0	3,035.9	3,081.4
	Amended quantity	Somerset	Waste-water via Sewer	Residential	Sewerage charge	Billing units			
	Final Amended quantity	Somerset	Waste-water via Sewer	Residential	Sewerage charge	Properties	2,817.7	2,891.1	2,966.5
37	Quantity	Somerset	Waste-water via Sewer	Business	Sewerage charge	Billing units	1,080.0	1,096.2	1,112.6
	Amended quantity	Somerset	Waste-water via Sewer	Business	Sewerage charge	Billing units			

6 Unitywater

This chapter presents Frontier's more detailed analysis of the proposed demand forecasts for Unitywater.

6.1 Proposed demand forecasts

Unitywater has forecast the following over the period July 2010 to June 2013:

- Residential customer connections for water are forecast to grow from 238,014 in 2010-11 to 248,601 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately 2.2 percent per annum.
- Residential wastewater connections are forecast to grow from 243,016 in 2010-11 to 253,801 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately 2.2 percent per annum.
- Non-residential customer connections for water are forecast to grow from 50,311 in 2010-11 to 52,544 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately 2.2 percent per annum.
- Non-residential wastewater connections are forecast to grow from 52,083 in 2010-11 to 54,442 in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately 2.2 percent per annum.
- Total water volumes (residential and non- residential) are forecast to grow from 48722.55 ML in 2010-11 to 51287.91 ML in 2012-13, representing an annual compounding growth rate (based on the three years of the forecast period) of approximately 2.6 percent per annum.
- Residential sewage volumes were not provided.
- Non-residential sewage volumes and trade-waste volumes were not provided.
- Recycled water volumes were not provided.

6.2 Connections

In the draft report Frontier compared Unitywater's proposed growth in residential connections with PIFU forecasted growth of dwellings and with historical trends based on data obtained for local government areas from the Queensland Water Commission. These comparisons are reported in Table 16.

Table 16: Residential growth rates (%).

LGA	Unitywater 2011-13 (Connections)	PIFU 2006-16 (Dwellings)	QWC 2008-10 (Connections)
Moreton Bay	2.4	2.85	2.3
Sunshine Coast	2.0	2.7	10.7

Source: Frontier estimates based on Unitywater submission, PIFU forecasts and QWC historical data.

Notes: growth rates reported above are the annual average compound rates. Unitywater's growth rates are based on the three year period and exclude the base year 2010. Historical growth estimates are based on the two year period 2008-10 to avoid structural change in LGA boundaries with Redcliffe, Pine Rivers and Caboolture becoming Moreton Bay, while Caloundra, Maroochydore and Noosa became the Sunshine Coast.

Based on PIFU forecasts in Table 16, the growth rates for residential connections proposed by Unitywater appear to be conservative. The growth rates for Moreton Bay are consistent with the historical trend rates but this is not the case for the Sunshine Coast.

In the absence of historical data provided by Unitywater, Frontier recommended in the draft report that growth rates based on PIFU forecasts of dwellings connections be adopted. These forecast growth rates are different to the historical trend growth rates, but we were mindful that the historical trend is based on a relatively short time period of just two years and may be less reliable given the structural changes in local government areas.

In addition the draft report noted that the PIFU dwelling projections for Unitywater for 2011 is 298,594 which differs from Unitywater's submission of 238,014 for water connections and 243,106 for wastewater connections (see Table 17). These estimates are lower than the PIFU projection by 25.5 % and 22.9 % respectively. Such differences may be driven by unsewered properties or unconnected properties.

Table 17: PIFU dwelling projections

Financial year	Moreton Bay	Sunshine Coast	Total households
2006	125,191	133,916	259,107
2011	144,183	154,411	298,594
2016	165,751	174,703	340,454

Source: PIFU 2010

Non-residential connections comprise connections for commercial, small industrial and large industrial customers. Unitywater's forecast growth rates are outlined in Table 18.

Table 18: Growth in non-residential connections (%).

LGA	Unitywater	QWC Historical growth 2008-10
Moreton Bay	2.4	3.3
Sunshine Coast	2.0	7.6

Source: Frontier estimates based on QWC historical data.

Unitywater has applied residential growth rates to both non-residential water and wastewater customers. In the absence of more robust information, we adopted the same approach in the draft report. We do note that QWC historical data for non-residential connections over the same period indicate a relatively large degree of variance between the two series, particularly in the case of the Sunshine Coast data.

In response to the draft report Unitywater indicated that it was somewhat preliminary to discount its existing methodology in the preference for the PIFU growth rates, and that further research needed to be undertaken. As Unitywater was unable to provide any information about their existing method in deriving the growth figures for both residential and non-residential connections, Frontier is unable assess Unitywater's approach.

Recommendations

In the absence of any further information Frontier recommends that residential connections be amended to reflect the PIFU growth rates for both water and wastewater.

Frontier has not amended non-residential connections for either water or wastewater as it is concerned that historical data for non-residential

connections indicate a relatively large degree of variance between the residential and non-residential connections. In the absence of information allowing for a more detailed understanding of the relationship between residential and non-residential users for Unitywater, Frontier has no basis upon which to make an amendment.

6.3 Water volumes

Unitywater has proposed the same growth rates for volumes across customer groups, but not across the two billing areas as illustrated in Table 19.

Table 19: Growth rates for volume forecasts, water (%)

Billing area	Customer type	Unitywater Proposed growth 2011-13	QWC Historical growth 2008-2010
Moreton Bay	Residential	4.7	11.6
	Non-residential	4.7	-22.1
Sunshine Coast	Residential	0.9	2.4
	Non-residential	0.9	-10.3%

Source: Frontier estimates based on Unitywater's response to Frontier's initial RFI and data provided by QWC.

Note Growth rates are the average annual compound rate for the period under consideration. QWC data is for ML/d.

Unitywater have used a number of assumptions regarding per person per day usage to develop their consumption forecasts. These assumptions include:

- residential consumption in Moreton Bay of 166 L/p/d for 2011, 2012 and 176 L/p/d for 2013. Unitywater bills residents for a bulk water charge and a three-tiered volumetric charge
- residential consumption in Sunshine Coast of 211 L/p/d for 2011, 208 L/p/d for 2012 and 204 L/p/d for 2013. Unitywater bills residents for a bulk water charge and a two-tiered volumetric charge

Frontier noted in the draft report that the QWC historical data indicate significantly higher growth rates for residential volume than those of Unitywater. An important observation is that non-residential volume forecasts decreased substantially. This may be due to the implementation of the Water Efficiency Management Plans under the PWCMs. In response to this draft report Unitywater should clarify the drivers underlying such changes.

The historical period 2008-10 captures a period of rapid easing of demand restrictions and subsequently growth rates for this period may include high levels of bounceback. For the period 2011-13 restrictions are expected to be held constant at a relatively low level (being PWCMs), and we would expect bounceback to be less pronounced.[15]

We expect to see bounceback for Moreton Bay as the region was subjected to water restrictions in recent years. However, we expect the Sunshine Coast forecasts of consumption per connection to decline because the region was never subjected to water restrictions, but now abides by PWCMs.

In the absence of robust historical data that captures periods prior to the implementation of restrictions it is difficult to assess whether Unitywater forecasts adequately account for bounceback for Moreton Bay.

Table 20:Per connection consumption, residential water (kLs)

Billing area	2011	2012	2013
Moreton Bay	152.10	149.92	158.93
Sunshine Coast	163.07	161.75	159.44

Source: Frontier estimates based on Unitywater submission

We noted in the draft report that on a per connection basis the Moreton Bay forecasts decrease slightly before substantially increasing. Given that PWCMs are applied consistently over the period Frontier does not consider the forecasts to be consistent with a gradual bounceback (see Table 20). In addition Unitywater have not provided any evidence regarding why per connection consumption should decrease in 2012. Accordingly Frontier amended the per connection forecast such that it is consistent with a long-term trend of increasing consumption in line with 2013.

In response to the draft report Unitywater indicated that the consumption profile for Moreton Bay initially reflected a decrease in per dwelling occupancy rates in 2012, causing a decrease in per connection consumption, followed by an increase in 2013 due to a previous assumption that this was year in which the drought

[15] The concept of bounceback refers to an increase in consumption following the lifting of water use restrictions. It is reasonable to expect that as restrictions are eased consumption will return (if not fully then partially) to levels similar to pre-restriction consumption. This return to pre-restriction consumption levels is generally referred to as 'bounceback'. How quickly customers return to consumption patterns and levels that were prevalent prior to restrictions coming into effect will influence the rate of growth in water demand over the period.

would break and that subsequently consumption would experience a degree of bounceback.

In the draft report Frontier noted that the Sunshine Coast forecasts are more consistent with our expectations; we observe a slowly declining level of residential consumption per connection over the forecast period.

In relation to price elasticity of demand, we note that Unitywater has not employed elasticity in its demand forecasts. While Frontier considers price elasticity of demand to be relevant given the relative easing of restriction levels and the proposal by Unitywater to material increase some volumetric prices, we are mindful that the general approach by the water business has been not to provide a price path for the three year period and that subsequently elasticity cannot be applied. In order to be consistent across all businesses and to avoid the risk of inappropriately applying elasticity Frontier has not included an elasticity factor in its amendments.

Recommendations

Frontier recommends adjusting Unitywater's residential volumetric forecasts to correct for assumptions regarding the end of the drought.

Frontier recommends adjusting Unitywater's residential volumetric forecasts to reflect the PIFU dwelling growth rates.

Frontier has not adjusted forecasts to account for elasticity of demand.

6.4 Wastewater

Wastewater connections have been adjusted to reflect the same growth rate as water connections, as per the approach proposed by Unitywater.

Residential and commercial wastewater volumes were not provided; this was because the associated charges are not volumetrically based.

Unitywater has flagged that some large industrial customers incur volumetric charges. However, these charges are computed as a fraction of the measured water consumption rather than from continuous measuring of wastewater flows. Hence, from the pricing point of view, forecasting wastewater volumes is not important for Unitywater.

Recommendations

Frontier has amended residential wastewater connections to reflect the PIFU dwelling growth rates.

6.5 Trade waste

Trade waste volume data were not provided. If trade waste charges are not volumetrically based, Unitywater would have no need to provide trade waste volume data. In the draft report, Frontier requested that Unitywater indicate the nature of its trade waste charges.

No response was provided to the draft report by Unitywater on this issue. Frontier contacted a representative in Unitywater's trade waste division who indicated that some customers pay on a discharged trade waste volumetric basis. Hence, trade waste volumes for these customers are relevant for the QCA Interim Price Monitoring review. Frontier is cognisant that trade waste volumetric charges vary across the districts and that collecting the relevant figures for each of the six districts is challenging at this point in time.

Recommendations

Going forward, Frontier recommends that Unitywater collect volumetric data for trade waste customers.

6.6 Recycled water

Unitywater did not provide data on recycled water volume. As part of the draft report, Frontier requested this information from Unitywater. No response was provided to the draft report by Unitywater on this issue. Frontier is aware that recycled water is provided in Caboolture and that a volumetric charge applies to both recycled water carriers and residences connected to the recycled water reticulation network.

Recommendations

Going forward, Frontier recommends that Unitywater collect data and generate demand forecasts for recycled water.

6.7 Long-term and short-term demand forecasts

Part of Frontier's brief is to assess the consistency between long-term demand forecasts used for capital planning and the short-term demand forecasts that underlie Unitywater's immediate pricing decision for the three year period under consideration.

From consultation with Unitywater, Frontier understands that it treats both short-term demand forecasting and long-term demand forecasting as separate undertakings. Specifically it adopts a number of different assumptions between the two, the most important being that it assumes a higher per person per day

consumption level for long-term forecasting than it does for short-term forecasting. Long-term volume forecasts for residential water demand are based on the PWCM initial target of 230 L/p/d.

In response to the draft report Unitywater stated that long-term forecasting for planning is influenced by a number of factors including security, quality of supply and pressure. Unitywater stated:

> The underlying reason for difference between short and long term is adoption of a different probability of exceedence and network risk profile for augmentation planning

Frontier considers that demand should be broadly consistent between both short and long-term forecasts. By consistency Frontier does not mean to imply that the forecasts should be exactly the same; they should be broadly similar once all the meaningful differences between the two series are accounted for. Although the forecasts are undertaken for different purposes the primary objective should always be to develop the most realistic set of forecasts based on the best available data and future expectations.

Where there is a need to consider peak demand or supply security, such considerations should be made explicit and transparent through either separate demand forecasts in the case of peak demand or through a separate planning mechanism (such as storage management or contingency planning like a security of supply buffer held in storage).

Recommendations

Frontier has not made any adjustments to Unitywater's long term demand forecasts, but recommends that Unitywater review its methodology as part of its ongoing development of a building block framework.

6.8 Revised forecasts

In amending Unitywater's proposed forecasts, Frontier made the following adjustments consistent with the recommendations above:

- Connection forecasts for residential customers were amended to reflect growth rates based on PIFU dwelling connection projections.
- We amended forecast residential consumption using the bulk-water residential consumption figures Unitywater provided
- We amended forecast residential consumption for each tier (three tiers for Moreton Bay and two for the Sunshine Coast). Using the ratio of each proposed tier consumption level to proposed bulk-water consumption, we amended forecast residential consumption of each tier in line with the relevant PIFU growth rate

- The PIFU dwelling connection growth rates were also applied to residential waste-water customers.

The amended forecasts are outlined in Table 21.

Table 21: Proposed and amended demand forecasts

Tariff	Parameter	Area	Service	Customer	Tariff Description	Unit	Sum of FY2010	Sum of FY2011	Sum of FY2012
1	Quantity	Moreton Bay	Drinking water	Residential	Access Charge	No. of properties	118,852.6	121,705.0	124,626.0
	Amended Quantity	Moreton Bay	Drinking water	Residential	Access Charge	No. of properties	118,852.6	122,244.6	125,178.4
	Final Amended Quantity	Moreton Bay	Drinking water	Residential	Access Charge	No. of properties	118,852.6	122,235.4	125,714.5
2	Quantity	Moreton Bay	Drinking water	Business	Access Charge	No. of properties	25,744.1	26,361.9	26,994.6
3	Quantity	Moreton Bay	Drinking water	Residential	Bu k Water Charge	kL/a	18,077,121.4	18,246,252.2	19,806,557.9
	Amended Quantity	Moreton Bay	Drinking water	Residential	Bu k Water Charge	kL/a	18,077,121.4	18,327,138.3	19,894,360.8
	Final Amended Quantity	Moreton Bay	Drinking water	Residential	Bu k Water Charge	kL/a	18,077,121.4	19,429,722.7	19,979,550.1
4	Quantity	Moreton Bay	Drinking water	Business	Bu k Water Charge	kL/a	3,915,596.7	3,952,231.3	4,290,201.5
5	Quantity	Moreton Bay	Drinking water	Residential	Tier 1 Volumetric Charge	kL/a	15,875,565.1	16,024,098.0	17,394,378.9
	Amended Quantity	Moreton Bay	Drinking water	Residential	Tier 1 Volumetric Charge	kL/a	15,875,565.1	16,068,517.2	17,519,919.9
	Final Amended Quantity	Moreton Bay	Drinking water	Residential	Tier 1 Volumetric Charge	kL/a	15,875,565.1	17,063,437.3	17,546,302.9
6	Quantity	Moreton Bay	Drinking water	Business	Tier 1 Volumetric Charge	kL/a	3,438,728.4	3,470,901.4	3,767,711.2
7	Quantity	Moreton Bay	Drinking water	Residential	Tier 2 Volumetric Charge	kL/a	415,268.0	419,153.3	454,996.6
	Amended Quantity	Moreton Bay	Drinking water	Residential	Tier 2 Volumetric Charge	kL/a	415,268.0	419,812.6	457,732.6
	Final Amended Quantity	Moreton Bay	Drinking water	Residential	Tier 2 Volumetric Charge	kL/a	415,268.0	446,340.0	458,970.6
8	Quantity	Moreton Bay	Drinking water	Business	Tier 2 Volumetric Charge	kL/a	89,949.2	90,790.7	98,554.6
9	Quantity	Moreton Bay	Drinking water	Residential	Tier 3 Volumetric Charge	kL/a	1,786,288.3	1,803,001.0	1,957,182.4
	Amended Quantity	Moreton Bay	Drinking water	Residential	Tier 3 Volumetric Charge	kL/a	1,786,288.3	1,806,152.6	1,969,294.8
	Final Amended Quantity	Moreton Bay	Drinking water	Residential	Tier 3 Volumetric Charge	kL/a	1,786,288.3	1,919,945.5	1,974,276.6

10	Quantity	Moreton Bay	Drinking water	Business	Tier 3 Volumetric Charge	kL/a	386,919.2	390,539.2	423,935.7
11	Quantity	Moreton Bay	Waste-water via Sewer	Residential	Sewerage Charge	No. of properties	118,386.8	121,228.0	124,137.5
	Amended Quantity	Moreton Bay	Waste-water via Sewer	Residential	Sewerage Charge	No. of properties	118,386.8	121,765.4	124,687.8
	Final Amended Quantity	Moreton Bay	Waste-water via Sewer	Residential	Sewerage Charge	No. of properties	118,386.8	121,756.3	125,221.7
12	Quantity	Moreton Bay	Waste-water via Sewer	Business	Sewerage Charge	No. of properties	28,796.3	29,487.4	30,195.1
13	Quantity	Sunshine Coast	Drinking water	Residential	Access Charge	No. of properties	119,161.2	121,544.4	123,975.3
	Amended Quantity	Sunshine Coast	Drinking water	Residential	Access Charge	No. of properties	119,161.2	122,378.7	124,826.3
	Final Amended Quantity	Sunshine Coast	Drinking water	Residential	Access Charge	No. of properties	119,161.2	122,371.9	125,669.1
14	Quantity	Sunshine Coast	Drinking water	Business	Access Charge	No. of properties	24,567.2	25,058.6	25,559.7
15	Quantity	Sunshine Coast	Drinking water	Residential	Bu k Water Charge	kL/a	19,431,745.2	19,659,997.2	19,767,105.8
	Amended Quantity	Sunshine Coast	Drinking water	Residential	Bu k Water Charge	kL/a	19,431,745.2	19,794,948.2	19,902,792.0
	Final Amended Quantity	Sunshine Coast	Drinking water	Residential	Bu k Water Charge	kL/a	19,431,745.2	19,793,840.6	20,037,167.1
16	Quantity	Sunshine Coast	Drinking water	Business	Bu k Water Charge	kL/a	7,298,087.3	7,383,813.2	7,424,040.6
17	Quantity	Sunshine Coast	Drinking water	Residential	Tier 1 Volumetric Charge	kL/a	15,545,396.1	15,727,997.7	15,813,684.6
	Amended Quantity	Sunshine Coast	Drinking water	Residential	Tier 1 Volumetric Charge	kL/a	15,545,396.1	15,724,331.9	15,809,998.8
	Final Amended Quantity	Sunshine Coast	Drinking water	Residential	Tier 1 Volumetric Charge	kL/a	15,545,396.1	15,835,072.5	16,029,733.7
18	Quantity	Sunshine Coast	Drinking water	Business	Tier 1 Volumetric Charge	kL/a	5,838,469.9	5,907,050.6	5,939,232.4
19	Quantity	Sunshine Coast	Drinking water	Residential	Tier 2 Volumetric Charge	kL/a	3,886,349.0	3,931,999.4	3,953,421.2
	Amended Quantity	Sunshine Coast	Drinking water	Residential	Tier 2 Volumetric Charge	kL/a	3,886,349.0	3,932,539.0	3,953,963.7
	Final Amended Quantity	Sunshine Coast	Drinking water	Residential	Tier 2 Volumetric Charge	kL/a	3,886,349.0	3,958,768.1	4,007,433.4

20	Quantity	Sunshine Coast	Drinking water	Business	Tier 2 Volumetric Charge	kL/a	1,459,617.5	1,476,762.6	1,484,808.1
21	Quantity	Sunshine Coast	Waste-water via Sewer	Residential	Sewerage Charge	No. of properties	124,628.8	127,121.4	129,663.8
	Amended Quantity	Sunshine Coast	Waste-water via Sewer	Residential	Sewerage Charge	No. of properties	124,628.8	127,994.0	130,553.9
	Final Amended Quantity	Sunshine Coast	Waste-water via Sewer	Residential	Sewerage Charge	No. of properties	124,628.8	127,986.8	131,435.3
22	Quantity	Sunshine Coast	Waste-water via Sewer	Business	Sewerage Charge	No. of properties	23,286.3	23,752.0	24,227.1

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