SEQ Water Grid manager

2012–13 Grid Service Charges

Submission to the Queensland Competition Authority

Secure and efficient water through partnership and innovation

Contents

Executive summary

As requested, the SEQ Water Grid Manager (Water Grid Manager) makes the following submission on the determination of Grid Service Charges for 2012–13.

This submission is based on our function as operator of the SEQ Water Grid (Water Grid) as an integrated water supply system. We do so mindful of our regulatory and contractual requirements, and the potential risks associated with water quality and supply continuity for the region.

The submission relates to capital expenditure proposed by the Grid Service Providers in submissions to the Queensland Competition Authority in February 2012. Our submission explains the proposed operation of the Water Grid to provide context for how this is relevant to assessing the need for the proposed capital expenditure. It provides comments on the services required by the Water Grid Manager from key assets.

By way of background, the Water Grid currently has a large amount of surplus capacity, across water supply and asset capacity. This surplus is due to dams being near full and customer demand remaining relatively low. It is reflected in current demand of about 276,000 megalitres (ML) per annum, compared with the system yield of about 485,000 ML and the installed water treatment capacity of about 750,000 ML. That is, current demand is less than half the installed water treatment capacity.

Given these circumstances, the Water Grid Manager is required to issue Grid Instructions to maximise the efficient and cost effective delivery of services. Accordingly, we made a number of changes to the operation of the system in 2010, in order to reduce operating costs. Further changes are now being made.

These changes will achieve efficiency by consolidating the treatment of water, avoiding the need to take water from some water treatment plants that are expensive to operate and for which new capital expenditure is proposed. We will primarily source water from seven water treatment plants, with five additional water treatment plants available to provide supplementary supplies in response to peak demands, or supply interruptions to other assets. Service will not be required from 11 water treatment plants for at least five years, and most likely more than fifteen years.

In its submission to the Queensland Competition Authority, LinkWater proposed that $21.8 million of capital expenditure be undertaken in 2012–13. The Water Grid Manager provides comment on the need for two of those projects; specifically, the Image Flat connection (estimated cost $2.1 million) and the ongoing SCADA implementation project (estimated cost $2.8 million). It endorses the need for both projects. The efficiency with which they are delivered is a matter for the Queensland Competition Authority.

Seqwater has proposed $433.4 million of capital expenditure to be undertaken over five years, mostly for projects commencing in 2012–13. A total of $130.6 million of capital expenditure is proposed for 2012–13.

The Water Grid Manager submits that some of the proposed capital expenditure appears to relate to assets where, over a five to at least fifteen year timeframe, service is either not required, or a reduced service is required. Where this is the case, the proposed capital expenditure may be able to be avoided, deferred or materially reduced.

Table 1 summarises the proposed capital expenditure which may be delivering a service that exceeds our needs. For these projects, the submission seeks to assist the Queensland Competition Authority by clarifying the services that are required from these assets. The total estimated cost of these projects is $175.1 million, including proposed expenditure of $39.4 million in 2012–13.

Table 1: Summary of comments on capital expenditure proposed by Seqwater.

Water treatment plant	Proposed works	Estimated project cost in 2012–13 ($ million)	Estimated total project cost ($ million)	Water Grid Manager comment on service requirements
South Maclean	Upgrade	2.3	4.4	Supply not required
Woodford	Upgrade	0.3	0.3	Supply not required
Caboolture	Upgrade	0.5	0.5	Supply not required
Image Flat	Upgrade	1.0	11.6	Supply not required following connection to the NPI
Molendinar and Mudgeeraba	Upgrades	4.0	22.9	Existing capacity adequate for system requirements
Canungra and off-stream storage	Upgrade	1.4	5.3	Presupposes the outcomes of planning study
Beaudesert	Upgrade	2.5	9.0	Presupposes the outcomes of planning study
North Stradbroke Island	Upgrades	1.1	4.1	Expenditure appears to pre-empt outcomes of detailed consideration of role of supply
Capalaba	Upgrades	3.0	15.0	Existing, constrained capacity adequate for system requirements for around five years
Gold Coast Desalination Plant	Upgrades	2.0	2.0	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Purified Recycled Water supply	Augmentation	1.1	1.1	Expenditure related to supply contracts that have not been executed yet
Lake MacDonald	Safety upgrade	1.0	25.8	Needed for regulatory compliance. Previously recommended to Seqwater that delivery options involving lower full supply levels be considered
Wyaralong	Detailed planning	1.0	2.0	Delivery timeframe should be confirmed before any further planning is undertaken
Kilcoy	Upgrade	8.4	16.1	Prudency of solution yet to be demonstrated
Boonah-Kalbar	Upgrades	2.5	9.3	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Lowood	Upgrades, including sludge handling improvements	2.0	3.3	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Kooralbyn	Upgrades, including sludge handling improvements	1.4	1.9	Existing capacity adequate for system requirements. Need for improvements not demonstrated

Water treatment plant	Proposed works	Estimated project cost in 2012–13 ($ million)	Estimated total project cost ($ million)	Water Grid Manager comment on service requirements
Rathdowney	Upgrades, including sludge handling improvements	0.5	0.7	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Jimna	Upgrades	1.7	1.9	Existing capacity adequate for system requirements. Need for improvements not demonstrated
SCADA business case and implementation	Upgrade	1.7	37.9	Project is needed. Detailed consideration by Authority warranted to ensure that system requirements and delivery are efficient
Total		**39.4**	**175.1**	

The Water Grid Manager does not provide comment on the need for, or efficiency of, the range of smaller renewal and upgrade projects. The Queensland Competition Authority may find some of these projects could be deferred, or delivered more efficiently than is currently proposed.

The submission relies upon the information provided by the Grid Service Providers in submissions to the Queensland Competition Authority. The Water Grid Manager is available to review and refine its advice should further supporting information be provided to the Queensland Competition Authority.

Our submission draws upon a range of Water Grid plans and supporting documents, including the Water Grid Annual Operations Plan, Water Grid Quality Management Plan and Water Grid Manager Annual Market Rules Review.

1 Introduction

This document is the Water Grid Manager's submission to the Queensland Competition Authority on the determination of bulk water charges for Seqwater and LinkWater for 2012–13.

The Water Grid Manager's submission refers to the submissions from those entities to the Queensland Competition Authority, made on 29 February 2012. On 1 March 2012, the Queensland Competition Authority provided those submissions to the Water Grid Manager for review.

Our submission outlines the services we require from key assets, taking into account forecast customer demands. It includes:

- an explanation of the background to the submission, including our role and function and the method by which we make decisions regarding the operation of the system (Section 2)
- an overview of the strategic context to systems operations, including forecast demand and the capacity and performance of the Water Grid (Section 3)
- an overview of the Operating Strategy, taking into the proposed costs that have been submitted to the Queensland Competition Authority (Section 4)
- comments on the services that are required from water treatment plants, where major capital expenditure is proposed (Section 5)
- comments on a number of other proposed LinkWater and Seqwater projects (Section 6).

2 Framework and methodology

This section explains the basis for the submission, including the:

- role and functions of the Water Grid Manager
- requirements relating to the services the Water Grid Manager provides to its customers.

2.1 Role and functions

The Water Grid Manager's role and functions are contained in the *SEQ Water (Restructuring) Act 2007*, *Water Act 2000*, *South East Queensland System Operating Plan*, *The Market Rules SEQ Water Market* and the contracts between the Water Grid Manager and its customers.

The Water Grid Manager purchases water services from the Grid Service Providers and supplies water to its customers. It does so by:

- issuing Grid Instructions that direct the operations of the Water Grid to meet the demands of its customers
- ensuring water supplied to its Grid Customers meets the service requirements, as described in more detail below.

Relevant to this function, the following roles and functions are assigned to the Water Grid Manager:

- We hold 10 year Grid Contract Documents with Grid Service Providers for the purchase of water services, and Grid Customers for the supply of water. These Grid Contract Documents govern the commercial transactions, and contain water quality specifications and supply obligations to meet Grid Customers' demand.
- Under the *South East Queensland System Operating Plan* (System Operating Plan), prepares and implements an Annual Operations Plan that demonstrates how we will meet Grid Customer forecast demands over a 12 month period having regard to an appropriate balance between security and cost efficiency outcomes.
- As requested, we provide advice to the responsible Ministers about the need for proposed new and replacement capital infrastructure, valued at greater than $2 million. Specifically, the advice is whether there is a clear and appropriate need for proposed expenditure by the Grid Service Providers, and that a full range of options have been considered, including alternative ways of operating the Water Grid and utilising existing infrastructure.

The above is consistent with the Queensland Competition Authority's report on its 2011–12 determination of Grid Service Changes. The report stated that:

> *"As the sole customer of the GSPs, the Authority considered that an endorsement from the WGM would provide compelling evidence of prudency to the Authority...*
>
> *...Under the revised definition, capital expenditure is prudent if:*
> - *it is required as a result of a legal obligation, growth in demand or renewal of existing infrastructure that is currently used and required by service contracts; or*
> - *it achieves an increase in the reliability or the quality of supply that is explicitly endorsed or required by the WGM."*

2.2 Service requirements

This submission has regard to our service requirements, which are primarily prescribed by legislation and regulatory instruments including the *South East Queensland System Operating Plan*, *The Market Rules SEQ Water Market* and the contracts between the Water Grid Manager and its customers. These service requirements are described below.

We consider these requirements across the Water Grid, as well as for subregions and demand zones when determining the dominant and alternative operating strategy. These subregions and demand zones are illustrated in **Figure 1**.

2.2.1 Cost

The System Operating Plan includes a principle that water supply arrangements should maximise the efficient and cost effective service delivery. We aim to achieve:

- operational efficiency by matching supply to demand and using lower cost supply options wherever possible
- capital efficiency by clearly specifying the services required from key assets, over the short and medium term.

Relevantly, those considerations highlight where capital expenditure may be deferred or avoided due to:

- service not being required from an asset over the short to medium-term, enabling it to be demobilised
- the full capacity of an asset not being required over the short to medium-term, enabling renewals to be deferred.

2.2.2 Supply security

Regional supply security requirements are contained in the System Operating Plan.

Maximum volume

The maximum volume of water the Water Grid Manager may enter into contracts to sell is 450,000 ML per annum.

Levels of Service objectives

The Water Grid Manager's Annual Operations Plan must demonstrate that all reasonable actions have been integrated to achieve the following desired Level of Service objectives:

- During normal operations sufficient water will be available to meet an average total urban demand of 375 litres per person per day (including residential, non-residential and system losses), of which 230 litres per person per day is attributed to residential demand.
- Medium level restrictions will not occur more than once every 25 years, on average.
- Medium level restrictions need only achieve a targeted reduction in consumption of 15% below the total consumption volume in normal operations.
- The frequency of triggering drought response infrastructure will be not more than once every 100 years, on average.
- The frequency that the total volume of water stored by all key Water Grid storages declines to 10% of their combined water storage capacity will be not more than once every 1000 years, on average.
- The total volume of water stored by all key Water Grid storages must not be permitted to reach 5% of the combined total water storage capacity of these storages.
- Wivenhoe, Hinze and Baroon Pocket dams must not be permitted to reach minimum operating levels.
- It is expected that medium level restrictions will last longer than six months, no more than once every 50 years, on average.

Risk criteria

The Water Grid Manager's Annual Operations Plan must demonstrate that all reasonable actions have been integrated to achieve the following risk criteria contained in **Table 2**.

Table 2: System Operating Plan risk criteria.

Volume of water stored by key Water Grid storages	Probability of reaching volume of water stored		
	Within 1 year	Within 3 years	Within 5 years
40%	Less than 0.2%	Not specified	Less than 5%
30%	Not specified	Less than 0.5%	Less than 1%

Operating rules

The System Operating Plan outlines various operating rules in Section 9 that the Water Grid Manager must follow when undertaking its responsibilities, such as preparing the Annual Operations Plan and issuing Grid Instructions.

2.2.3 Water quality

Water quality requirements are primarily contained in the:

- *Water Supply (Safety and Reliability) Act 2008*
- Grid Contract Documents, which includes Legislative Requirements
- the *Australian Drinking Water Guidelines 2011.*

For water quality, there are health and aesthetic parameters.

The Grid Service Providers, as drinking water service providers, are responsible for managing health parameters in accordance with their respective obligations under the *Water Supply (Safety and Reliability) Act 2008,* and consistent with the *Australian Drinking Water Guidelines 2011*, and as specified in Grid Contract Documents. Those obligations include the preparation and implementation of drinking water quality management plans.

The Grid Service Providers may rely upon actions by the Water Grid Manager in order to comply with those requirements, such as a commitment by the Water Grid Manager to not issue a Grid Instruction that requires supply from an impaired source.

The Water Grid Manager contributes to the achievement of aesthetic parameters, through the instructions it issues for the operation of the Water Grid. For example, it may direct that water that contains elevated levels of taste and odour compounds be blended with water from another source that does not. These aesthetic parameters are specified as best endeavours targets in Grid Contract Documents, based on the historic performance of the supplies that previously existed in those areas.

2.2.4 Supply reliability

There is currently no standard in customer or Grid Service Provider contracts held by the Water Grid Manager in relation to supply reliability. However, historically supply reliability has been of a very high standard.

In this absence, the submission reflects the internal targets that the Water Grid Manager has derived based on historic performance, industry benchmarks for good practice and balance modelling of system demand, capacity and reservoir storage.

These targets will be refined over time as more Grid Participant data becomes available and system assessments completed. In the meantime, these targets form the basis for preliminary assessments of the capacity requirements on Grid Service Providers assets.

Supply reliability is assessed using two measures of asset performance:

- system capacity, being potential system throughput, measured against average day and mean day maximum month demand
- system reliability, being a measure of the continuity of supply from the system, measured by frequency and duration of failure to supply from both an asset and combined system.

System capacity

System capacity is assessed against forecast average and mean day maximum month demands, across within demand zones and at key assets.

The internal standard we have adopted is that system capacity must exceed forecast mean day maximum month demand for a forecast period of at least three years. This standard applies within the connected area of the Water Grid and to stand-alone sources of supply. It ensures that there is sufficient time to plan, design and construct additional capacity.

System reliability

Distribution Retail Entities are required to set Customer Service Standards for continuity of supply. For example, Queensland Urban Utilities has set standards that:

- there be less than or equal to 100 unplanned water interruptions per 1000 connections per year
- supply be restored to normal service within five hours on 90% of occasions.

These standards apply at the consumers tap. They will be achieved through the combination of bulk and distribution infrastructure.

The Water Grid Manager has developed reliability standards for the bulk network, taking into account these Customer Service Standards. These standards are that:

- Bulk supply may be interrupted causing localised interruptions over one suburb for up to 24 hours no more than once every 25 years, on average.
- Bulk supply may be interrupted causing localised interruptions over multiple suburbs for up to 48 hours no more than once every 100 years, on average.

We have proposed that these standards be applied as part of a planning process currently underway for Beaudesert and Canungra (refer Section 5.6 and Section 5.7).

These draft standards apply across the bulk network as a whole, like the Levels of Service objectives. Targets are also required for individual assets, so as to provide a basis for the management and investment decisions by the relevant Grid Service Provider. The draft reliability targets for water treatment plants are that:

- for stand-alone water treatment plants, full production outages for up to 48 hours no more than once every two years
- for water treatment plants within the connected area of the Water Grid, full production outages for a specified duration no more than once every two years.

At this time, system reliability is considered to be a flexible requirement that provides a guide for options development and assessment. Options should generally seek to achieve this level of reliability at least overall cost, subject to other operational requirements. Alternative outcomes should be considered, where higher levels of reliability can be achieved at similar costs.

The Distribution Retail Entity is responsible for sizing and operating distribution assets to maintain its commitments to its consumers.

2.3 Information relied upon

In addition to the legislation and regulatory instruments mentioned above, this submission also draws upon a range of Water Grid Manager documents. These include:

- the *SEQ Water Grid Quality Management Plan* (Water Grid Quality Management Plan)
- the *SEQ Water Grid Annual Market Rules Review* (Annual Market Rules Review)
- the *SEQ Water Grid Emergency Response Plan* (Emergency Response Plan)
- advice provided to the Queensland Water Commission on 18 January 2011 that identifies and describes matters that may have a material impact on the need for new or upgraded bulk water supply works in 2012–13, as required by Schedule 5 section 2 of the System Operating Plan
- the forthcoming *SEQ Water Grid Manager 20 Year Operations Strategy* (20 Year Operations Strategy).

Further explanation on the above documents can be found at **Attachment 1.**

In relation to the proposed capital expenditure, we primarily relied on the submissions made to the Authority on 29 February 2012. We also had regard to the interim statements to the Queensland Water Commission by Seqwater, dated 28 February 2012, and LinkWater, dated 3 March 2012. The SOP requires that these statements address the matters listed in our advice of 18 January 2012.

We note that Seqwater's submission to the Queensland Authority, dated 29 February 2012, and its interim statement to the Queensland Water Commission, dated 28 February 2012, contain numerous references to planning studies and business cases and to Grid Participants being involved in or consulted about those processes. The Water Grid Manager participated in some preliminary discussions for those planning studies. However, with few exceptions, it has not had the opportunity to contribute to or review those documents. It has also not been provided copies of the final documents for its information, with few exceptions.

2.4 Method

Our Annual Operations Plan and forthcoming 20–year Operations Strategy set out the services we anticipate that we will require from the Grid Service providers over the short to long term, having regard to the service requirements detailed above and our customers' forecast demand.

Attachment 2 describes the method by which the Annual Operations Plan and 20–year Operations Strategy are developed. It explains inputs to the assessment, as well as the process and systems through which this information is synthesised and a preferred Operating Strategy developed.

For this submission, we have compared the Grid Service Providers' Queensland Competition Authority submissions to our Annual Operations Plan and 20–year Operations Strategy to provide advice to the Queensland Competition Authority as to whether we see a need for the expenditure proposed by the Grid Service Providers from a whole-of-Grid perspective.

3 Strategic context

This section describes the background to the operating strategy. It provides an overview of forecast demand, the current status of the Water Grid and the relative cost effectiveness of each water treatment plant.

3.1 Forecast demand

Residents and businesses of South East Queensland continue to be highly water efficient, with demand at almost half of pre-drought levels, with limited evidence of a material demand rebound.

Prior to the drought, average total urban consumption in South East Queensland was 450 litres per person per day. Of that total, approximately 300 litres per person was used for residential use.

By comparison, average total consumption has been about 250 litres per person per day since permanent water conservation measures were introduced, including in areas that were not previously subject to the Commission restrictions. Of this total, as illustrated in **Figure 1**, average residential consumption:

- in central South East Queensland, has remained constant at around 140 to 150 litres per day since early 2009, with 10 to 20 litres per day nominally being for outdoor irrigation (based on assumed average internal use of 130 litres per day)
- the Gold Coast has averaged about 195 litres per day since early 2009, from which time it was exempted from Medium Level Restriction (averaging 65 litres per day for outdoor irrigation, based on the same assumption)
- the Sunshine Coast has averaged around 185 litres per day since early 2010, having reduced from up to 310 litres per day during dry weather in late 2009 (averaging 55 litres per day of outdoor irrigation, with peaks of up to 180 litres per day).

Significantly, these trends are not unique to South East Queensland. Since 2005, similar reductions have been achieved in other Australian capital cities. For example, domestic water use in Melbourne averaged around 240 litres per person per day in 2000, compared with around 153 litres per person per day in 2009[1]. In Sydney, total water consumption has fallen from 506 litres per person per day in 1991 to 314 litres per person per day in 2010[2].

[1] Wallis, P., Birrell, R., Griggs, D., Healy, E., Langford, J., and Stanley, J. (2009),'Melbourne's water situation: the opportunity for diverse solutions.' *Monash Sustainability Institute Report 09/2*, Melbourne.
[2] NSW Office of Water. (2010). '2010 Metropolitan Water Plan'. *Department of Environment, Climate Change and Water*, Sydney.

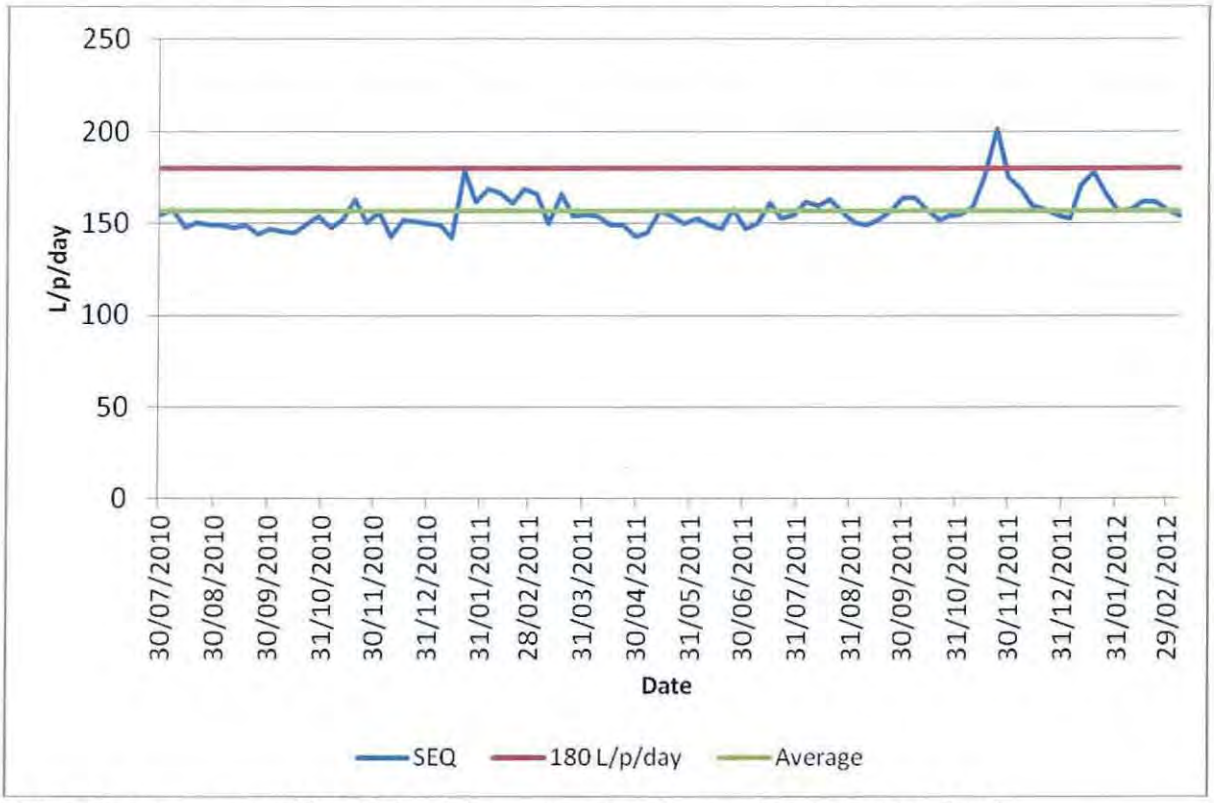

Figure 1: Average weekly residential consumption for South East Queensland.

Based on these trends, the Water Grid Manager considers that there is unlikely to be a major rebound in demand.

For residential uses, we consider that some rebound is likely. The scale and timing of this rebound will primarily be determined by the extent to which residents return to using drinking water supplies for outdoor use. While significant increases in outdoor use may occur in the future during dry periods, we now consider that average residential consumption is unlikely to increase to beyond 180 litres per person per day. In the meantime, we expect average residential consumption to remain at around 160 litres per person per day.

For non-residential uses, we understand that water efficiency was primarily achieved through structural measures. As a result, we consider this component of demand is largely unrelated to climate and therefore unlikely to rebound beyond what has already occurred. On average, we expect these uses to remain constant at about 90 litres per person per day.

Demand rebound precedents

There are limited precedents to assess if the behavioural changes made during the Millennium Drought will be maintained into the future. The information available for recent droughts in Australia and overseas indicates that rebound usually occurs gradually over a minimum of two years with maximum savings of 10 to 15%. However, the extent and duration of demand reduction in South East Queensland exceeds that previously experienced in other major cities during severe drought. Price increases are also likely to be a more significant factor than following previous droughts.

Continued assessment of actual rebound in South East Queensland will be undertaken to inform updates to this Operating Strategy.

These assumptions match the low demand scenario in the *South East Queensland Water Strategy Annual Report 2011*. They are also reflected in forecasts of likely demand over the next three years, as submitted to the Water Grid Manager by its customers. Those forecasts are summarised in **Figure 2**.

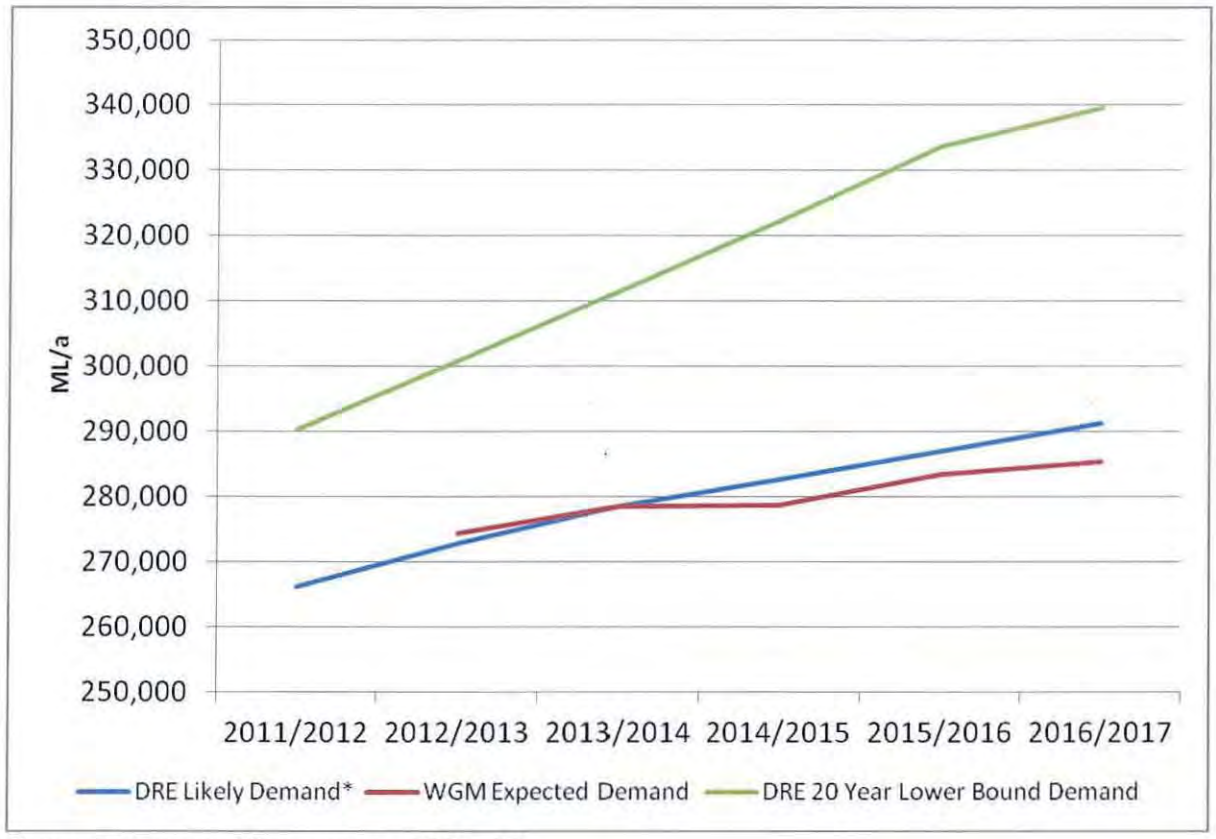

Figure 2: Demand forecasts to 2016–17.
(* Note that, for the purposes of comparison, Distribution Retail Entity (DRE) likely forecasts have been extrapolated from three to six years duration.)

Beyond the next five years, Distribution Retail Entities have generally based forecasts on the *South East Queensland Water Strategy 2010* planning assumption of 375 litres per person per day. We consider that this assumption is no longer appropriate, for reasons outlined above.

As a result, we have prepared our own forecasts of demand over the next 20 years. These forecasts reflect a continuation of current trends, with allowance for annual variation due to climate. Total forecast demand is similar to the low demand scenario in the *South East Queensland Water Strategy Annual Report 2011*, with potential variation between local areas.

These forecasts are summarised in **Table 3**. In combination, they provide upper and lower estimates of likely demand. More detailed forecasts will continue to be prepared on an area specific basis as appropriate.

Table 3: Forecast average day demand to the year 2030–31.

	2016–17	2020–21		2025–26		2030–31	
		Current trends	Rebound	Current trends	Rebound	Current trends	Rebound
Unitywater	60,500	63,700	76,500	67,600	83,000	71,600	89,500
Queensland Urban Utilities	134,100	141,900	170,200	152,000	186,800	162,400	203,200
Allconnex Water	90,900	95,100	114,100	100,300	123,300	105,800	132,300
Purified recycled water	11,900	11,900	11,900	11,900	11,900	11,900	11,900
Total	297,300	312,600	372,700	331,800	405,000	351,600	436,900

3.2 Operating context

South East Queensland is in its strongest water security position in more than a decade, due to the Water Grid being complete, low consumer demand, and many of our water supply sources at full or near-full supply capacity.

Within the connected area of the Water Grid, this stronger water security position means the Water Grid can be operated in alternative ways. It means we do not need to access some of our water entitlements over the short to medium term, with opportunities to materially defer or avoid the need for upgrades to some water treatment plants and pipelines.

In relation to supply security, the Water Grid has increased the system yield through the construction of new supplies and interconnecting pipelines. The current system yield is 485,000 ML per annum, measured on a Level of Service basis, and including allowance for droughts significantly worse than any experienced to date[3]. This system yield will soon increase once the Northern Pipeline Interconnector Stage 2 is commissioned, and again following the construction of the Wyaralong Water Treatment Plant and connecting infrastructure.

We will operate below this system yield until about between 2035 and 2041, based on the low demand forecast described in Section 2.1, and depending upon the impact of climate change. For example, total consumption in 2011–12 is forecast to be about 276,000 ML, which represents only 57% of the available yield.

In the meantime, low demand means that we can comply with the long term Level of Service objectives and other regulatory obligations, without using all of our water entitlements. For example, demand is forecast to remain more than 100 000 ML per annum below system yield until around 2024, and 50 000 ML per annum below system yield until around 2030.

In relation to supply reliability, the resilience of the system has been improved due to the construction of the pipelines and new supplies. Previously, South East Queensland was supplied from eight separate water systems. While some of these systems included multiple supplies, many did not. The construction of the Water Grid means that most demand zones in the connected area are able to be supplied from multiple sources, as illustrated in **Figure 3** and **Figure 4**.

There is also a significant surplus of treatment capacity, due to the connection of existing supplies and the construction of new assets. The total treatment capacity of assets within the connected area is now 750,000 ML per annum, compared to current demand of around 276,000 ML and the system yield of 485,000 ML. **Figure 5** illustrates nominal water treatment plant capacity compared with average day and mean day maximum month demand within the connected area and for stand-alone supplies[4].

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[3] Queensland Water Commission (2011) *South East Queensland Water Strategy Annual Report 2011*. System yield is based on the Gold Coast Desalination Plant operating at capacity when key Water Grid storages are at or below 60% of combined capacity and purified recycled water being used to augment Wivenhoe Dam when storages are at or below 40% of capacity.

[4] Estimate excludes the treatment capacity of the Western Corridor Recycled Water Scheme in order to avoid double counting. Purified recycled water will be used to augment Wivenhoe Dam when key Water Grid storages are below 40% of combined capacity. When that occurs, the blended water needs to be retreated at the Mt Crosby water treatment plants, meaning that the capacity of those plants is the critical constraint.

At the same time, lower average and peak demands have reduced requirements on existing treatment and transport infrastructure, across both the connected and unconnected areas of the Water Grid. The persistent, reduced extent of peak demands means that the same volume of emergency storage will last for a longer period of time, thereby increasing system reliability.

In relation to water quality, a range of improvements have been implemented since the commencement of the Water Grid. Asset and operational improvements include:

- constructing a number of new water treatment plants that produce excellent quality water, including the Gold Coast Desalination Plant, and Ewen Maddock and Noosa water treatment plants
- blending drinking water from multiple sources in order to mitigate or reduce the impact of events potentially affecting water aesthetics
- improving and coordinating the operation and maintenance of assets, including a whole-of-Grid focus on the management of secondary disinfection and disinfection by-products.

Water quality management policy improvements include the introduction of Drinking Water Quality Management Plans and Hazard Analysis and Critical Control Point Plans, and the rationalisation and public reporting of water quality monitoring.

Water quality monitoring results reflect that the water being produced is consistent with the *Australian Drinking Water Guidelines* long-term compliance measures and Grid Contract Document requirements, as reflected in the monthly *Customer Confidence Report (Bulk Water)*. These results are summarised in **Table 4** for the year to date.

Table 4: Results from the Customer Confidence Report, showing compliance to *Australian Drinking Water Guidelines 2011* long-term measures (February 2011 to January 2012).

	Health samples		Aesthetic samples		Compliance to the *Australian Drinking Water Guidelines (2011)*		
Parameter name	Number that passed	Number that failed	Number that passed	Number that failed	98 percent passed guideline[1]	95th percentile below guideline	Average below guideline
Escherichia coli	1352	1			Yes		
Fluoride	1317	0				Yes	
Total Trihalomethanes	270	0				Yes	
Lead	226	0				Yes	
Copper	290	0	290	0		Yes	Yes
Manganese	930	0	930	0		Yes	Yes
Hardness			318	4			Yes
pH			930	0			Yes
Turbidity			930	0			Yes
Total dissolved solids			651	0			Yes
True colour			930	0			Yes
Aluminium			929	0			Yes
Iron			927	0			Yes

Note:

1. This measure has been retained pending detailed assessment of changes that should be made to the Customer Confidence Report to reflect the recently released 2011 version of the *Australian Drinking Water Guidelines*.

This assessment assumes that the Gold Coast Desalination Plant continues to operate in stand-by mode and that the Western Corridor Recycled Water Scheme continues to be available to augment Wivenhoe Dam when key Water Grid storages fall to 40% of combined capacity. It also assumes that there is not a permanent change to the full supply level of Wivenhoe or North Pine dams.

Changes to these assumptions would reduce the system yield. It would not impact upon the operating strategy over the next five, and most likely not for at least ten. However, it would bring forward the time at which we would require supply from the Lander Shute Water Treatment Plant to recommence, as well as potentially from some other minor sources. It would also bring forward the need to construct the Wyaralong Water Treatment Plant and the next source of supply beyond this time period.

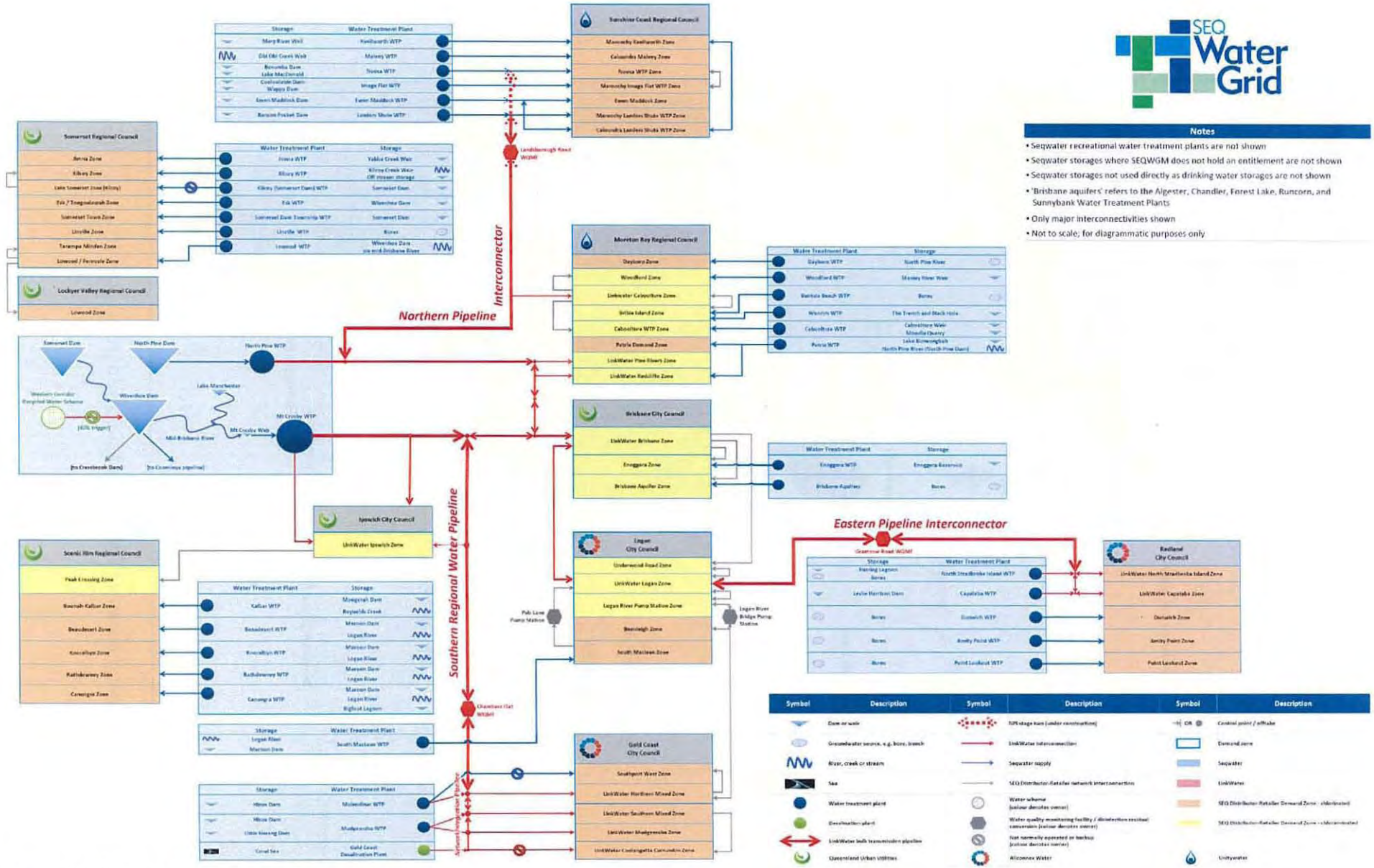


Figure 3: Water Grid supply zones and assets.

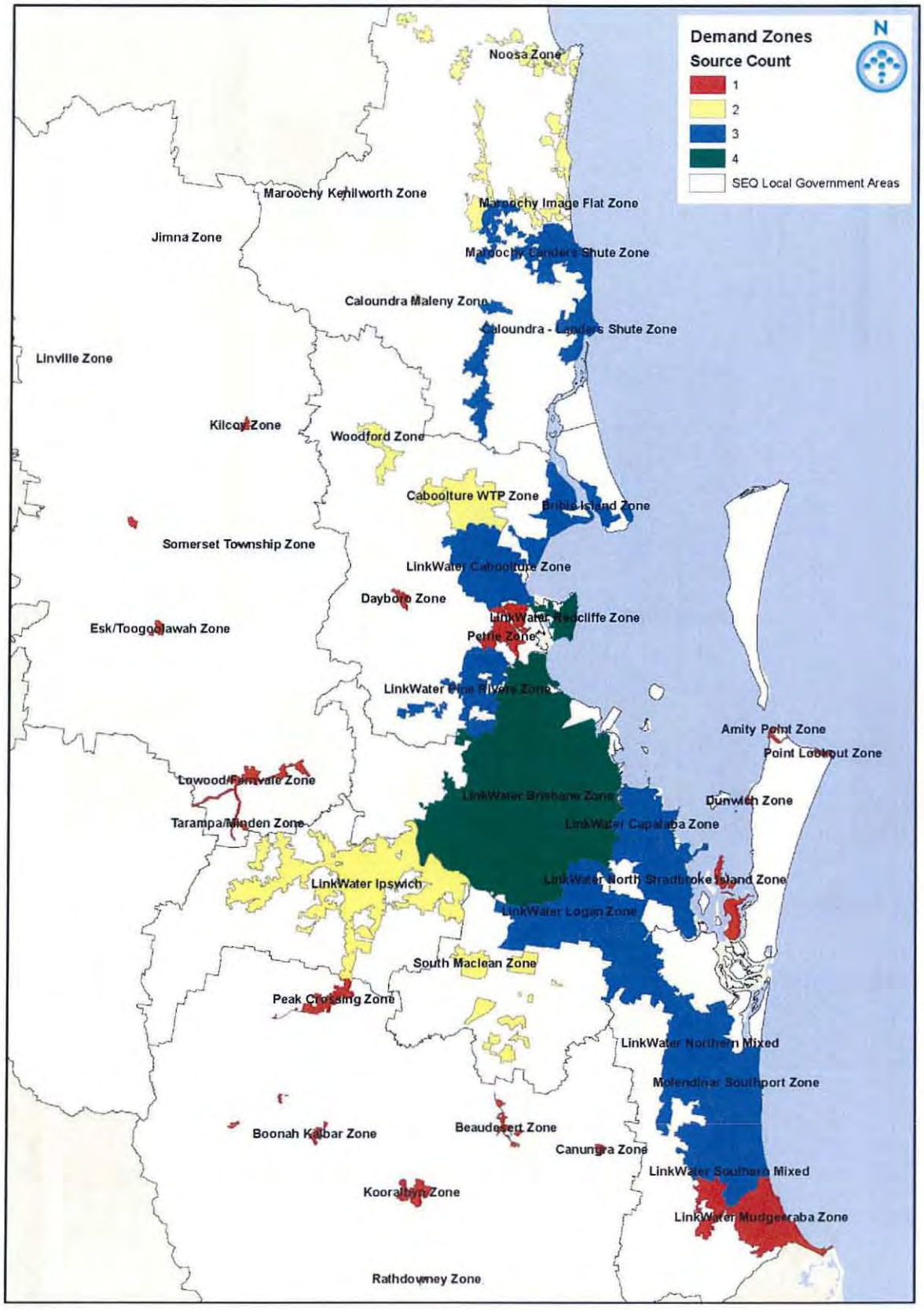


Figure 4: Water Grid demand zones and number of supply sources.

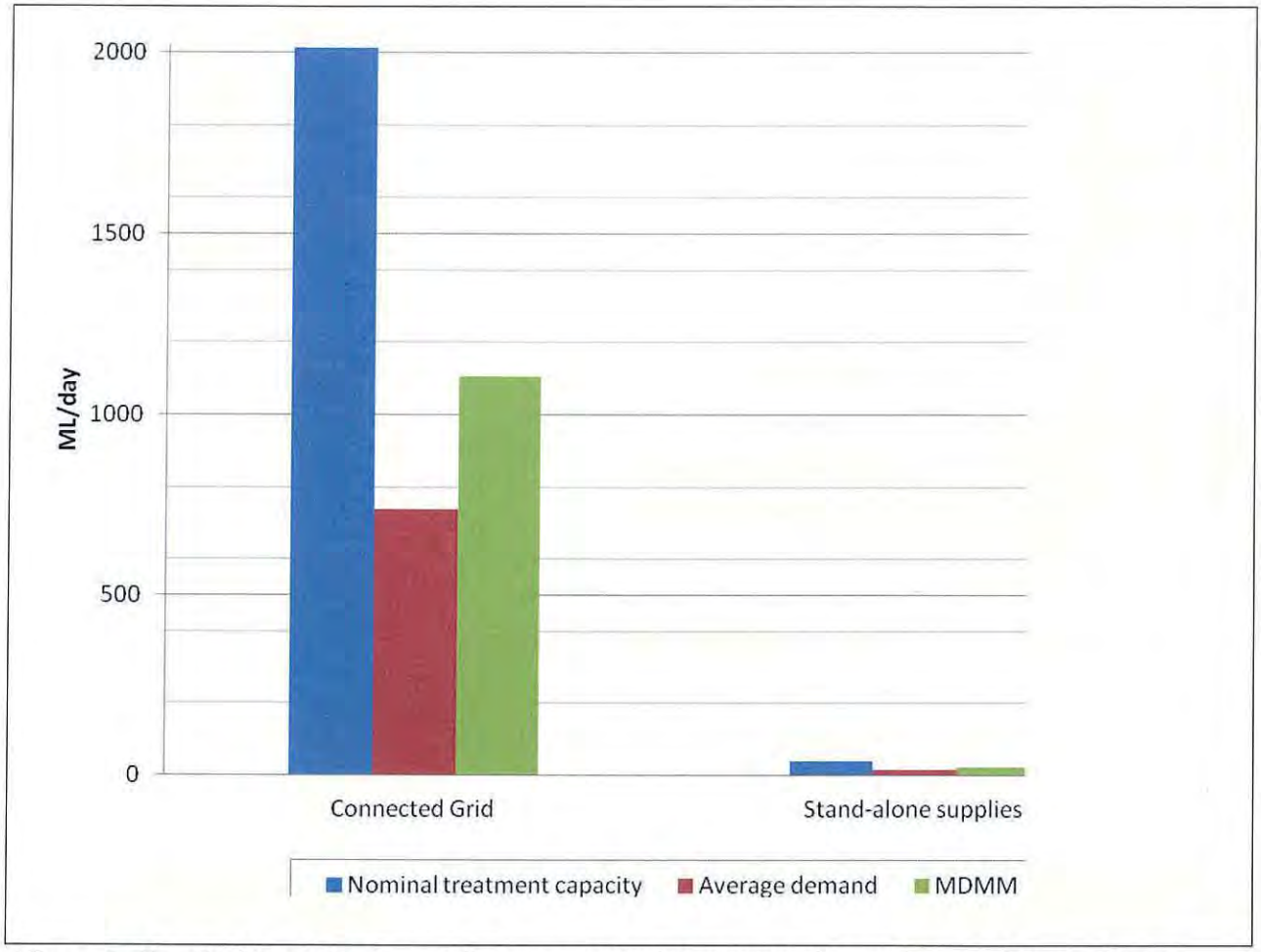


Figure 5: Nominal treatment capacity compared with average day and mean day maximum month demand.

3.3 Cost

We have assessed the February 2012 submissions to the Queensland Competition Authority to identify potential further efficiency gains through modifications to the current operating strategy.

Figure 6 and **Figure 7** show the annualised present value of the capital and operational costs per megalitre of capacity of each water treatment plant. The plants are grouped into two categories, being those connected to the Water Grid and those that are stand-alone sources of supply. These figures provide an indication of the total level of expenditure by water treatment plant per megalitre. It is understood that some of this capital expenditure may be required regardless of the operating state. Fixed, variable, renewal and augmentation costs are identified, based on categories and information provided in the Seqwater submission.

These estimates provide an indication of where efficiency gains could be made by moving to alternate modes of operation. Actual savings are assessed across the Water Grid system as a whole, using a portfolio approach and taking into account all system requirements.

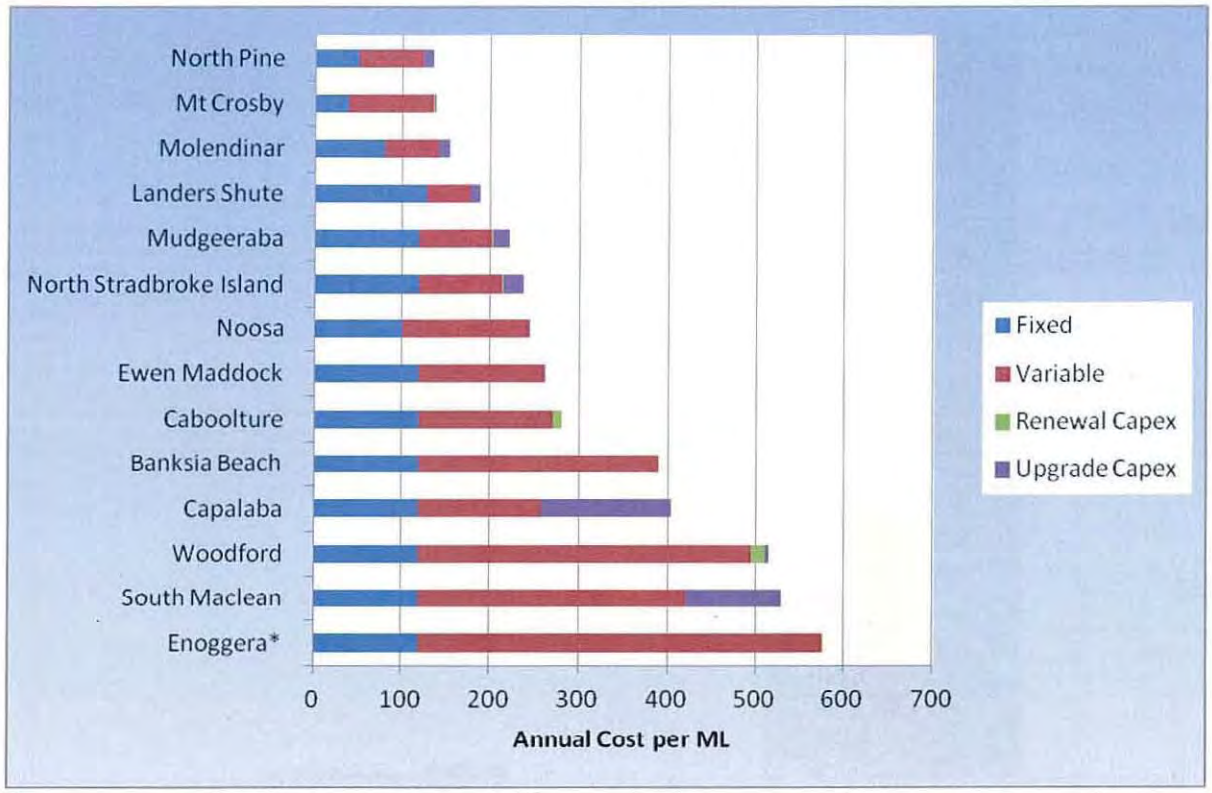


Figure 6: Annualised present value per ML capacity for connected water treatment plants.

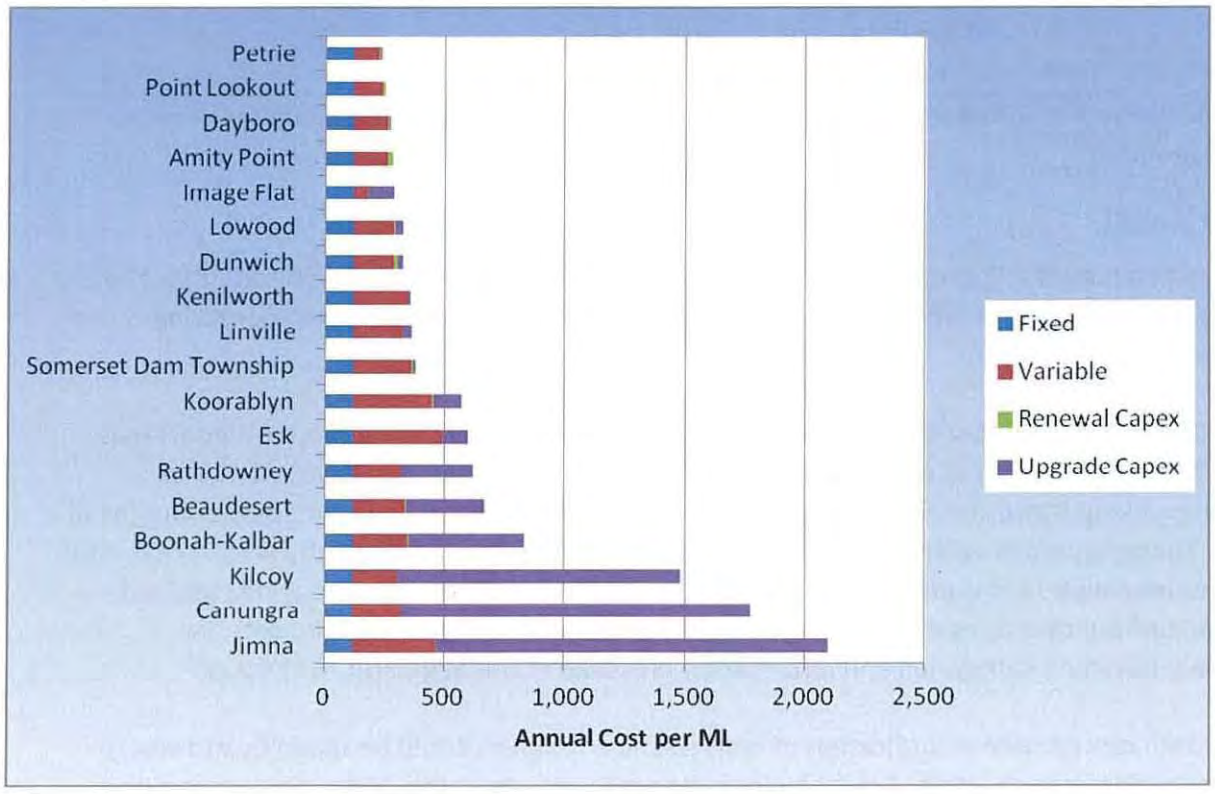


Figure 7: Annualised present value per ML capacity for stand-alone water treatment plants.

4 Operating strategy

The present strong supply security situation enables the Water Grid Manager to focus on ensuring the Water Grid is operated as efficiently as possible.

A suite of efficiency initiatives were introduced in 2010, following the introduction of permanent conservation measures. These initiatives include:

- The production of potable water from climate resilient sources has been minimised. For example, the Gold Coast Desalination Plant is now operated in stand-by mode when not required in response to water quality incidents or key assets being unavailable due to planned maintenance or an asset failure. This represents a saving of about $650,000 per month, compared to operation at a consistent production of 33% of full capacity.
- Transfers between sub-regions, subject to minimum flow requirements, have been minimised. For example, transfers through the Southern Regional Water Pipeline are generally between 25 and 30 ML per day. This represents a saving of about $120,000 per month, compared to operation at capacity.
- Water is generally treated at lower cost water treatment plants, subject to operational constraints and transport costs. For example, water is being supplied to the Morayfield and Caboolture areas via the Northern Pipeline Interconnector from the Landers Shute Water Treatment Plant in preference to operating the Caboolture Water Treatment Plant. This represents a saving of up to $15,000 per month.
- No supply is required from the Woorim and Maleny water treatment plants. These plants are currently being decommissioned, avoiding fixed operating costs and the need for extensive capital upgrades.
- No supply is required from the Brisbane Aquifer Project for at least five years. This change has avoided fixed operating and asset renewals costs. To compensate, supply has been increased from larger, more efficient water treatment plants. The Mt Crosby Water Treatment Plant supplies water to Brisbane at about one-fifth of the short-run variable cost of the Brisbane Aquifer Project, and without any additional staff or maintenance costs.

We have recently completed a comprehensive review of strategic operations. This review has confirmed that the number of water treatment plants that treat and supply water to the connected area of the Water Grid can be rationalised, reducing operating costs and potentially deferring some of the capital expenditure that has been proposed by Seqwater in its February 2012 submission to the Authority.

The review of strategic operations also highlighted that other water treatment plants may continue to be operated within existing constraints over the short to medium term, potentially deferring the need for expenditure on capital renewals. These savings are possible because the existence and operation of the Water Grid enables us to accept lower levels of service from specific assets than would be appropriate if those assets were operating in isolation, while still maintaining a high service standard from the system as a whole.

In summary, the proposed mode of operation within the connected area of the Water Grid involves:

- Base load supply from nine key water treatment plants, operating within existing capacity (see **Table 5**). These water treatment plants have a combined treatment capacity of more than 1,300 ML per day—about 500,000 ML per annum—accessing all key Water Grid storages.
- Supplementary supply from an additional four water treatment plants, operating within existing capacity (see **Table 5**). These water treatment plants have a combined treatment capacity of more than 500 ML/day—more than 185,000 ML per annum. They will be directed to treat the minimum amount of water required so that they maintain availability, and at higher levels in response to peak demands or supply interruptions to other assets.
- The Gold Coast Desalination Plant to continue operation in stand-by mode, with an available treatment capacity of 125 ML per day.
- The Western Corridor Recycled Water Scheme to continue operation of two of its four advanced water treatment plants to supply a target of 35 ML per day to power stations and for commercial and industrial purposes. The other two advanced water treatment plants will remain demobilised until required as part of the response to a severe drought.
- Minimal flows through regional interconnections, while maintaining their availability to respond to peak demands or supply interruptions to other assets.

The indicative operation of the system as a whole is illustrated in **Figure 8** and **Figure 9**, for average and mean day maximum month demands in 2016–17. The proposed function of each water treatment plant is summarised in **Table 5**, including those water treatment plants from which supply is not required over the short and medium term. The later water treatment plants include Caboolture, Image Flat, Woodford and South Maclean.

The review has identified triggers, at which point we will need:

- increased supply from operating water treatment plants
- base load supply from the Gold Coast Desalination Plant
- recommencement of supply from demobilised water treatment plants, including those requiring significant capital expenditure.

The Brisbane Aquifer Project and the Image Flat and Enoggera water treatment plants will be required to recommence supply:

- when demand approaches the system yield
- prior to key Water Grid storages falling to 40% of combined capacity, with the precise trigger depending on the actual demand at that time.

These triggers are not expected to be reached for at least 10 years, based on current supply security (see Section 2.2.2).

Supply will not be required from a number of other water treatment plants at any time, due to those water treatment plants being permanently decommissioned. These water treatment plants include Albert River, Aratula, Maleny, Toogoolawah and Woorim. The future role of the remaining water treatment plants needs to be agreed between Seqwater and the Queensland Water Commission.

Outside the connected area of the Water Grid, the Water Grid Manager will seek to ensure that every water treatment plant has sufficient capacity to meet likely demands over the next five years. Beyond these requirements, any additional capacity should only be delivered when demonstrated to be required based on demand at that time. This will provide time for options to be fully considered, and future demand scenarios to be better understood. In specific locations where demand forecasts are still highly variable, a staged implementation may be prudent to avoid over-capitalisation.

Section 5 and **Attachment 5** provide further information about the service requirements over the next five years.

Table 5: Function of each water treatment plant within the connected area of the Water Grid.

Base load water treatment plants	Supplementary water treatment plants	Water treatment plants from which supply is not required, at least for five years
Noosa	Banksia Beach[2]	Albert River[3]
Landers Shute	Capalaba	Aratula[3]
North Pine	Ewen Maddock	Brisbane Aquifer Project
North Stradbroke Island	Gold Coast Desalination Plant	Caboolture
Petrie	Mt Crosby West Bank	Enoggera
Molendinar	Western Corridor Recycled Water Scheme	Image Flat[4]
Mt Crosby East Bank		Maleny[3]
Mudgeeraba		Murrumba Downs[5]
Petrie[1]		Toogoolawa[3]
		South Maclean
		Woodford
		Woorim[3]

Notes:

1. Subject to detailed investigation. Capacity augmentation is required in around five years. This may involve connection to the Northern Pipeline Interconnector, from which time supply may no longer be required from this water treatment plant.
2. Subject to detailed reliability investigation to be undertaken with Unitywater. Depending upon outcomes, supply may not be required.
3. Permanently decommissioned.
4. No supply required from the time that the connection from the Northern Pipeline Interconnection is completed and commissioned.
5. The Murrumba Downs Advanced Water Treatment Plant is a Unitywater asset, the cost of which the Water Grid Manager contributes under contract. Supply has been minimised. It will be demobilised if and when the Minister approves a proposed change to the Grid Contract.

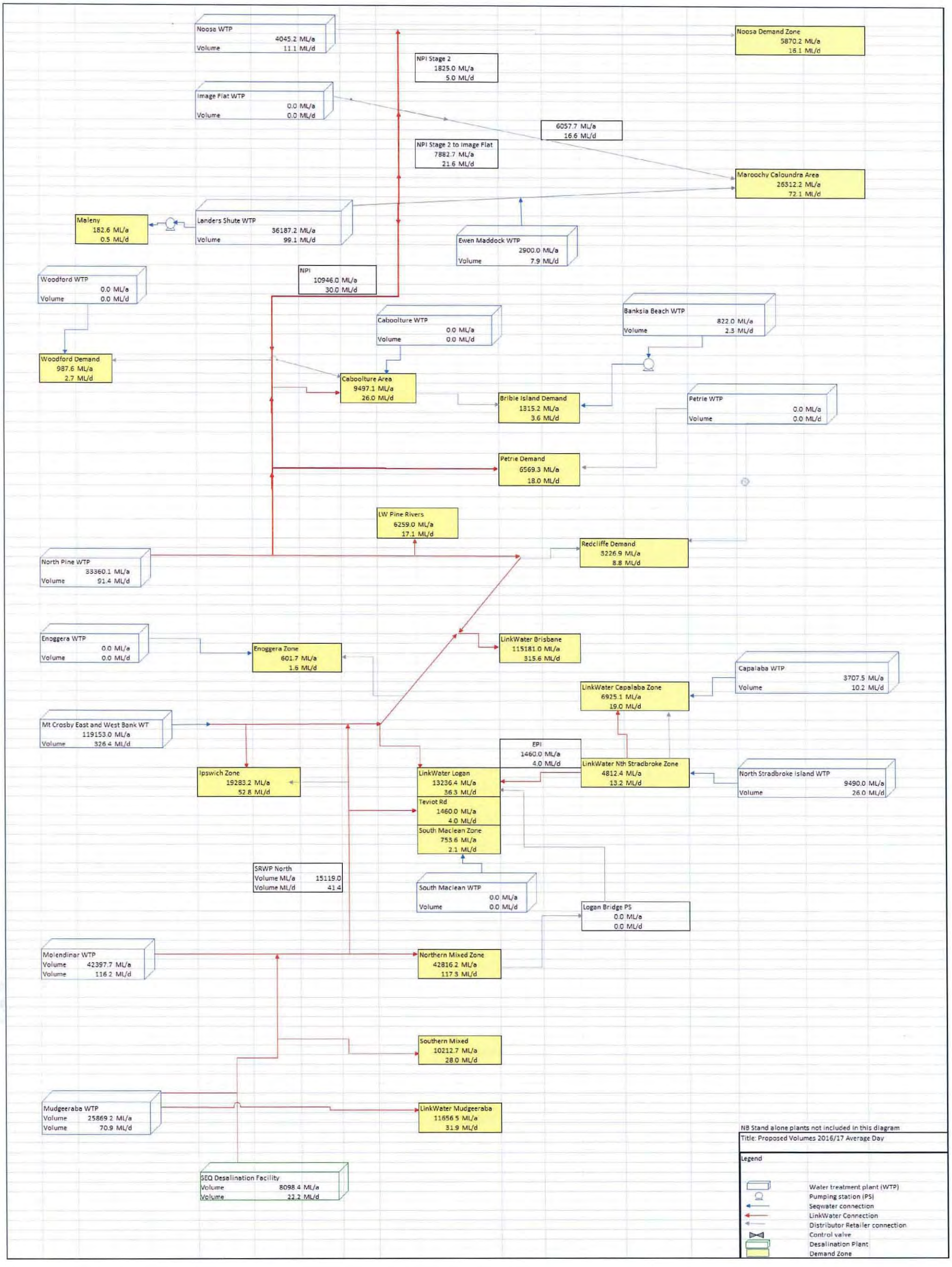


Figure 8: Forecast system operations for forecast average day demand in 2016–17.

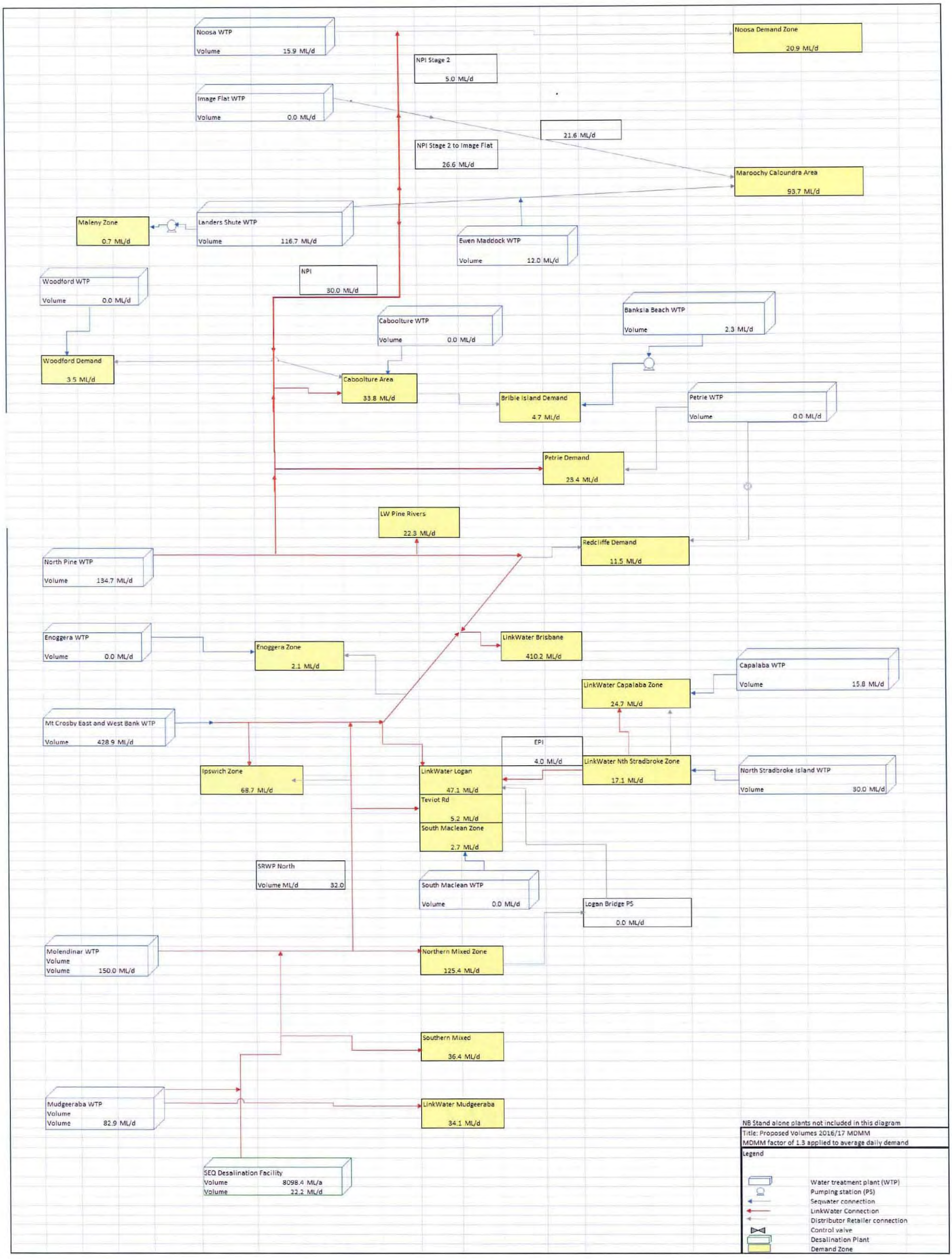


Figure 9: Forecast system operations for forecast mean day maximum month demand in 2016–17.

4.1 Supply security

The operating strategy outlined above will not have a material impact on water security.

The impacts of the changes have been assessed using the short term, forecast functionality of the SEQ Regional Water Balance Model. This model is usually used to demonstrate compliance with the five year risk criteria outlined in the System Operating Plan. For the purpose of this assessment the simulation was run for 20 years.

The proposed operating strategy was compared with the current mode of operation. Modelling assumed that the changes would be permanent, with various water treatment plants not producing water for the duration of the simulation. In practice, supply would recommence in accordance with the triggers outlined above. As a result, the simulation demonstrates the worst security outcome possible for the operation of these plants.

Table 6 demonstrates that the Operating Strategy outlined above meets the risk criteria outlined in the System Operating Plan. The results are the same as for the current mode of operation.

Table 6: Performance against System Operating Plan risk criteria.

Volume of water stored by key Water Grid storages	Probability of reaching volume of water stored		
	Within 1 year	Within 3 years	Within 5 years
40%	Less than 0.01%	Criteria not specified	0.01
30%	Criteria not specified	Less than 0.01%	Less than 0.01%

The probabilistic assessment of potential storages levels over the coming 20 years is shown in **Figure 10.** In summary, there is:

- approximately 80% probability that combined grid storage volumes will remain above 80% of capacity throughout the 20 year assessment period
- less than 5 percent probability that combined grid storage volumes will fall below 60% of capacity during assessment period, triggering the operation of the Gold Coast Desalination Plant at full capacity and the potentially the recommencement of supply from other water treatment plants
- about 0.1% probability that combined grid storage volumes will fall to or below 40% of capacity during assessment period, triggering the use of PRW to augment Wivenhoe Dam and the reintroduction of medium level restrictions.

Figure 11 illustrates the cumulative probability of key Water Grid storages falling to 60% and 40% of combined capacity, for the current operating strategy and the operating strategy outlined above. There is very little change in the probability of storages reaching these levels.

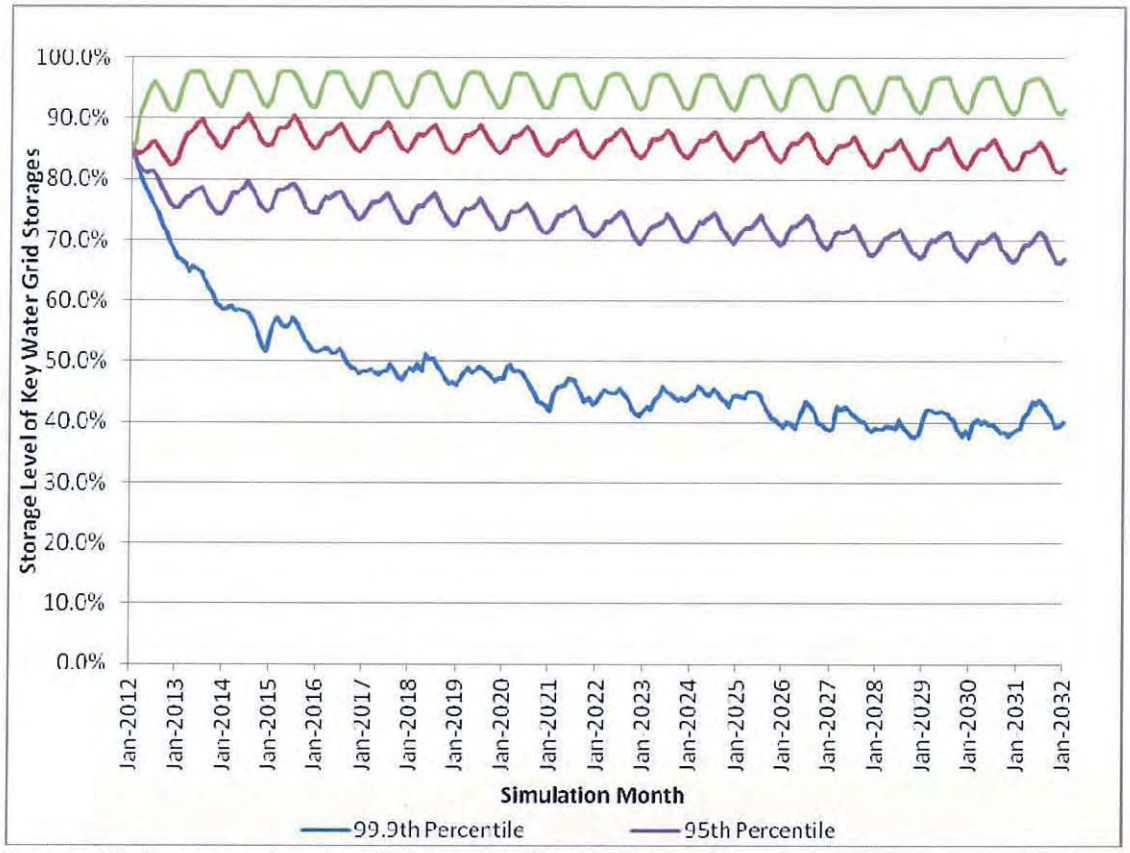


Figure 10: Forecast dam levels (proposed operating strategy).

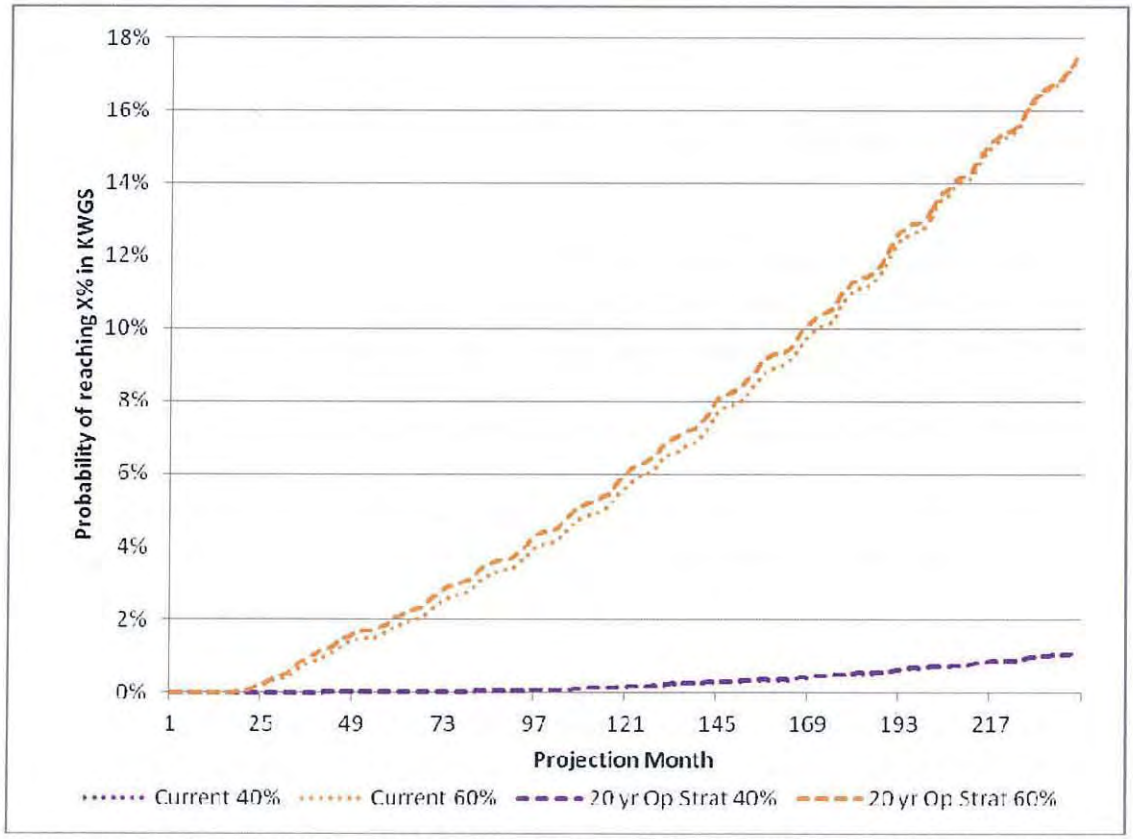


Figure 11: Probability of key Water Grid storages falling to 60% and 40% of combined capacity.

While the regional risk statistics show little difference between the current mode of operation and the Operating Strategy outlined above, the probability of hitting key levels in individual storages is affected to a higher degree. The degree to which these probabilities are affected varies between storages. The probability of Baroon Pocket Dam reaching 60% increases significantly, due to no supply being taken from some of the other Sunshine Coast dams (refer **Table 7**). This type of impact is not evident on the Gold Coast, as the operation in that area is largely unchanged (refer **Table 8**).

Table 7: Probability of reaching 60% in Baroon Pocket Dam.

Operation	Within 5 years	Within 10 years	Within 20 years
Current operations	16%	34%	65%
Proposed operating strategy	28%	52%	80%

Table 8: Probability of reaching 60% in Hinze and Little Nerang dams.

Operation	Within 5 years	Within 10 years	Within 20 years
Current operations	4%	12%	39%
Proposed operating strategy	5%	13%	40%

Table 9: Probability of reaching 60% in Brisbane system dams.

Operation	Within 5 years	Within 10 years	Within 20 years
Current operations	2%	7%	20%
Proposed operating strategy	3%	8%	22%

4.2 Water quality

Water quality will be maintained or improved, under the operating strategy outlined above.

In relation to health water quality parameters, the operating strategy will reduce risk by not taking water from a number of higher risk water treatment plants. These water treatment plants are Caboolture, South Maclean, Woodford and Woorim. While the quality of water delivered is high, risk assessments by Seqwater have previously indicated that some high and medium treated water quality risks still exist at these locations.

The operating strategy is also consistent with the continued improvement of disinfection management across the connected area of the Water Grid. In the bulk water network, improvements include the implementation of these operating modes, as well as the installation of reservoir mixers and increased chlorine dosing at key water treatment plants.

In relation to aesthetic water quality parameters, the management and mitigation of events will generally continue to be achieved through the transferring and blending of bulk drinking water. In particular, the raw water treated at the Mt Crosby water treatment plants periodically contains elevated concentrations of taste and odour compounds. These aesthetic risks are effectively managed through the operation of the system as a whole, including by reducing the supply from these sources, and by blending the remaining supply with drinking water transferred from the Gold Coast.

This response has already been implemented in response to incidents in the summers of 2009–10, 2010–11 and 2011–12, with few complaints to distributor-retailers above baseline levels.

Beyond these systems initiatives, the Water Grid Manager relies upon Seqwater and LinkWater to continue to meet their respective legislative and contractual obligations as drinking water providers. It supports continued improvement of management systems and processes, and continued investment by Grid Service Providers in monitoring and control systems.

4.3 Supply reliability

The Operating Strategy outlined above will not have a material impact on system reliability. Multiple sources of supply will continue to be available across most of the connected area of the Water Grid, as illustrated in **Figure 12** (excluding WTPs that are not required to provide service for at least five years).

Any potential increased risks due to not requiring supply from some water treatment plants are considered to be manageable, using the combination of alternative sources, and bulk and distribution storage capacity.

The reliability of the Water Grid was assessed at the years 2011 and 2021 without supply from the water treatment plants listed in **Table 5**, including South Maclean, Caboolture, Image Flat and Woodford. Modelling indicates that reliability of supply would be assured in scenarios involving the failure of a key supply asset for between three and five days.

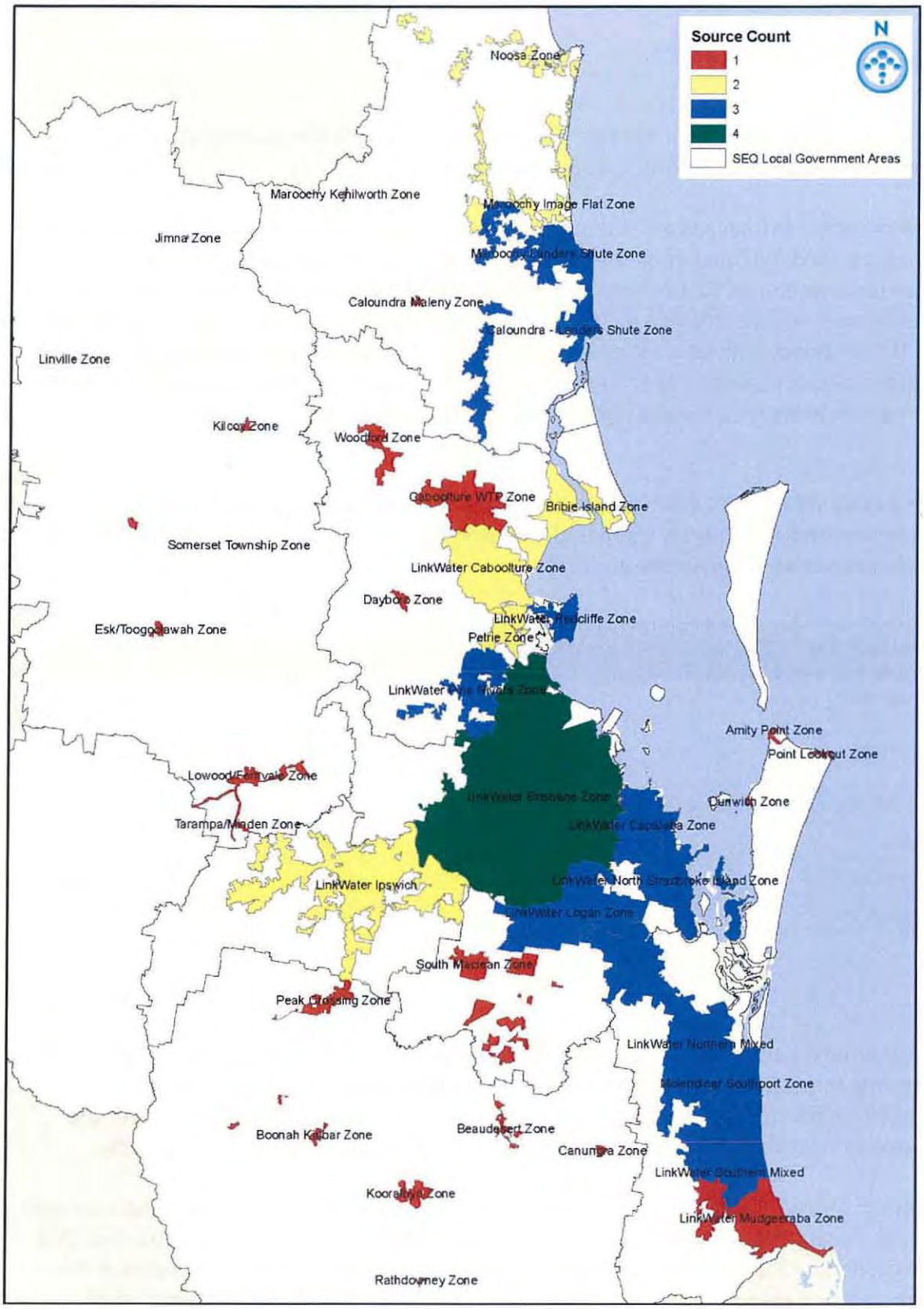


Figure 12: Demand zones and number of supply sources (proposed operating strategy).

5 System needs

The operating strategy outlined in Section 4 is relevant to some of the capital expenditure proposed by Seqwater and LinkWater, as outlined below.

LinkWater proposes to undertake $21.8 million of capital expenditure in 2012–13. The Water Grid Manager provides comment on the need for two of those projects, being the Image Flat connection (estimated cost $2.1 million, see Section 5.1) and the implementation of the SCADA system (estimated cost $2.8 million in 2012–13, see Section 6.1). It endorses the need for both projects. The efficiency with which they are delivered is a matter for the Authority. The Water Grid Manager cannot comment on the need for the other proposed capital expenditure, due to that expenditure being for a range of small projects intended to maintain existing service capacity.

Seqwater has identified $433.4 million of capital expenditure over five years, mostly for projects commencing in 2012–13. Estimated expenditure in 2012–13 is $130.6 million. **Table 10** lists the key categories of expenditure.

Table 10: Seqwater proposed capital expenditure ($ million).

Category of expenditure	2012–13	Total 2012–13 to 2016-17
Dam safety upgrades	20.5	121.5
Upgrades	42.7	118.5
Renewals	17.4	18.1
Desalination and advanced water treatment plants	8.5	10.7
Future projects	0	48.0
SCADA, ICT, land and fleet	39.3	111.6
Non-Grid projects	1.4	4.1
Other	0.7	0.7
Total	**130.5**	**433.4**

This section provides comment on the need for some of the first four categories of projects, to the extent that they may be affected by our service requirements. These four categories comprise $89.1 million of the proposed expenditure in 2012–13 and $268.8 million over the five year period. Section 6 provides some limited comment about other types of projects.

For the projects listed in **Table 11**, the proposed capital expenditure may be delivering a service that exceeds those requirements. Where this is the case, the Water Grid Manager submits that proposed capital expenditure may be able to be avoided, deferred or materially reduced. The total estimated cost of these projects is $175.1 million, including proposed expenditure of $39.4 million in 2012–13.

Table 11: Summary of comments on capital expenditure proposed by Seqwater.

Water treatment plant	Proposed works	Estimated project cost in 2012–13 ($ million)	Estimated total project cost ($ million)	Water Grid Manager comment on service requirements
South Maclean	Upgrade	2.3	4.4	Supply not required
Woodford	Upgrade	0.3	0.3	Supply not required
Caboolture	Upgrade	0.5	0.5	Supply not required
Image Flat	Upgrade	1.0	11.6	Supply not required following connection to the NPI
Molendinar and Mudgeeraba	Upgrades	4.0	22.9	Existing capacity adequate for system requirements
Canungra and off-stream storage	Upgrade	1.4	5.3	Presupposes the outcomes of planning study
Beaudesert	Upgrade	2.5	9.0	Presupposes the outcomes of planning study
North Stradbroke Island	Upgrades	1.1	4.1	Expenditure appears to pre-empt outcomes of detailed consideration of role of supply
Capalaba	Upgrades	3.0	15.0	Existing, constrained capacity adequate for system requirements for around five years
Gold Coast Desalination Plant	Upgrades	2.0	2.0	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Purified Recycled Water supply	Augmentation	1.1	1.1	Expenditure related to supply contracts that have not been executed yet
Lake MacDonald	Safety upgrade	1.0	25.8	Needed for regulatory compliance. Previously recommended to Seqwater that delivery options involving lower full supply levels be considered
Wyaralong	Detailed planning	1.0	2.0	Delivery timeframe should be confirmed before any further planning is undertaken
Kilcoy	Upgrade	8.4	16.1	Prudency of solution yet to be demonstrated
Boonah-Kalbar	Upgrades	2.5	9.3	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Lowood	Upgrades, including sludge handling improvements	2.0	3.3	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Kooralbyn	Upgrades, including sludge handling improvements	1.4	1.9	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Rathdowney	Upgrades, including sludge handling improvements	0.5	0.7	Existing capacity adequate for system requirements. Need for improvements not demonstrated
Jimna	Upgrades	1.7	1.9	Existing capacity adequate for system requirements. Need for improvements not demonstrated
SCADA business case and implementation (see Section 4.2)	Upgrade	1.7	37.9	Project is needed. Detailed consideration by Authority warranted to ensure that system requirements and delivery are efficient

Water treatment plant	Proposed works	Estimated project cost in 2012–13 ($ million)	Estimated total project cost ($ million)	Water Grid Manager comment on service requirements
Total		**39.4**	**175.1**	

We are aware that Seqwater and LinkWater are undertaking planning for a range of other works that may be proposed to be undertaken between 2013–14 and 2016–17. For example, Seqwater has commenced planning studies for the Mt Crosby East Bank, Mt Crosby West Bank and Esk water treatment plants. We understand that it has also completed a planning report for the North Pine, Petrie and Dayboro water treatment plants.

We will seek to work with Seqwater and LinkWater as part of those planning processes, prior to submissions being made to the Authority for the determination of the 2013–14 Grid Service Charges.

5.1 South Maclean Water Treatment Plant

Seqwater has proposed an upgrade to the South Maclean Water Treatment Plant, at an estimated cost of $4.4 million. The submission to the QCA states that the capital expenditure relates to an upgrade. No consultation or other supporting information has been provided to the Water Grid Manager.

Supply from the South Maclean Water Treatment Plant is no longer required.

This forthcoming Annual Operations Plans and all subsequent Grid Instructions will direct that the South Maclean Demand Zone be supplied from the Southern Regional Water Pipeline. This has occurred on several occasions over the past five years, including when the plant was shut down in response to issues with raw water quality. In addition, it is noted that Allconnex Water plans to provide supply to the urban growth areas of Yarrabilba and Flagstone using upgraded connections to the Southern Regional Water Pipeline. Ultimately, the demand zone will also be able to be supplied from the Wyaralong Water Treatment Plant and connecting pipeline.

Given that no supply is required, the water treatment plant could be permanently decommissioned, avoiding the need for any future capital expenditure.

The decision to not take supply from the South Maclean Water Treatment Plant will have no material impact on water security over the short or long term. The Water Grid Manager does not need the water supply yield from the South Maclean Weir to comply with its obligations under the System Operating Plan over the short and medium term, for reasons outlined in Section 4.1. Long-term, the allocation will be accessed by the proposed Wyaralong Water Treatment Plant.

On an annualised cost basis, the South Maclean Water Treatment Plant is one of the highest cost water treatment plants in the connected Water Grid (see Section 3.3).

In relation to water quality, the change will improve consistency of disinfection levels and chlorine residuals in the supply network, thereby reducing risk associated with transitioning between different disinfection regimes which was caused by plant shut down events.

The Water Grid Manager has previously provided this advice to Seqwater and Allconnex Water as part of operational planning work for the Logan South supply area. Details supporting that advice was provided to those parties in May 2011 in a draft report entitled *South Maclean supply options.* It is understood that Allconnex Water supports decommissioning the South Maclean WTP, which aligns with preferred bulk supply options outlined in the *Logan South Strategic Water Supply Planning Study* prepared by the Logan Water Alliance.

In its advice to the Queensland Water Commission on 18 January 2012, the Water Grid Manager stated that the future of this plant should be considered during 2012–13 as part of a wider planning forum being led by Queensland Water Commission. The Queensland Water Commission has since been informed that the forum also concluded that South Maclean Water Treatment Plant was not required, and had no material impact on future supplies in the Scenic Rim area; as such South Maclean Water Treatment Plant has now been excluded from consideration by that forum.

5.2 Woodford Water Treatment Plant

Seqwater has proposed to upgrade the Woodford Water Treatment Plant at an estimated cost of $274,000, to be undertaken over 2012–13 and 2013–14. The submission to the Queensland Competition Authority states that the upgrade is to replace filters, a backwash pump and provide additional instrumentation. The interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012, states that a planning study had been completed for this area but not that capital upgrades were required in 2012–13. No other supporting information has been provided to the Queensland Competition Authority or Water Grid Manager.

Supply from the Woodford Water Treatment Plant is not required.

The Woodford demand zone is currently being supplied from the Northern Pipeline Interconnector via Elimbah Reservoir. This mode of operation is reflected in the current Annual Operations Plan and Grid Instructions.

Given that no supply is required, the Woodford Water Treatment Plant could be decommissioned, avoiding the need for any future capital expenditure. A decision to decommission the Woodford Water Treatment Plant will have no material impact on water security over the short or long term. The entitlement from this source is 1,250 ML, compared to current demand of about 290,000 ML per annum and the Level of Service system yield of 450,000 ML.

In relation to supply reliability, the Water Grid Manager proposes to undertake a detailed investigation of the pipeline connection from the Northern Pipeline Interconnector with Unitywater. Depending upon the outcomes of the study, it may be necessary to augment the

existing pump to improve pumping capacity or alter the way in which water is delivered to customers along the pipeline to ensure that the pipeline is suitable to be operated consistently.

The Water Grid Manager considers that any such works would be more efficient than the proposed Woodford Water Treatment Plant upgrade. It notes that these works are likely to be required regardless of the operation of the Woodford Water Treatment Plant, due to the supply yield of the existing Woodford Water Treatment Plant being less than future demands. The Water Grid Manager also notes that Seqwater risk assessments have previously identified a high water quality risk at the existing Woodford Water Treatment Plant.

5.3 Caboolture Water Treatment Plant

Seqwater has proposed an upgrade the Caboolture Water Treatment Plant at an estimated cost of $511,000, to be undertaken over 2012–13 and 2013–14 (in addition to expenditure of $235,000 in 2011–12). The submission to the Queensland Competition Authority states that the upgrade is to upgrade the filters as well as other chemical dosing work. The interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012, stated that a planning study had been completed for this area but not that capital upgrades were required in 2012–13. No other supporting information has been provided to the Water Grid Manager.

Supply from the Caboolture Water Treatment Plant is not required.

Instead, the Caboolture demand zone is currently being supplied from the Northern Pipeline Interconnector. This mode of operation is reflected in the current Annual Operations Plan and Grid Instructions.

Operating without the Caboolture Water Treatment Plant has no material impact on water security over the short or medium term. The estimated yield of that source is 3,600 ML, compared to the Level of Service system yield of 450,000 ML.

Given that no supply is required, the Caboolture Water Treatment Plant could be decommissioned, avoiding the need for any future capital expenditure.

In time, the Caboolture Water Treatment Plant could be reinstated if the yield is required. However, the source will be increasingly impacted by urban development, with associated water quality risks. Rather than construct an upgraded water treatment plant, it may be more economical to replace the relatively small yield with an alternative source.

In relation to system reliability, there is sufficient reservoir capacity in this area to continue supply of water in periods when pipelines from Landers Shute or the Northern Pipeline Interconnector are being maintained . However, it is noted that a small part of the Caboolture distribution area experiences reduced water pressures when the Caboolture Water Treatment Plant pumps are not operating. Unitywater is currently investigating how best to resolve this – on the assumption that the Water Treatment Plant is to be decommissioned.

5.4 Image Flat connection and Water Treatment Plant

LinkWater proposes to construct a connection to the Northern Pipeline Interconnector at an estimated cost of $2.1 million.

The Water Grid Manager endorses the need for this connection. It stated that it was required in its *2010–11 Annual Market Rules Review* and in advice to the Queensland Water Commission dated 18 January 2012. As explained in the advice to the Queensland Water Commission, the interconnection will improve reliability of supply in this area and reduce the supply requirements of the Image Flat Water Treatment Plant, potentially deferring the need for significant capital cost upgrades for 5–10 years.

Separately, Seqwater has proposed to upgrade the Image Flat Water Treatment Plant at an estimated cost of $11.6 million, to be undertaken over 2012–13 to 2015–16. The submission to the Queensland Competition Authority states that the purpose of the upgrade is for sludge handling and chemical dosing. No other supporting information has been provided to the Water Grid Manager. This includes the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012, which did not identify the need for capital upgrades to be undertaken in 2012–13.

Once the connection to the Northern Pipeline Interconnector is constructed, the Water Grid Manager will not require supply from the Image Flat Water Treatment Plant.

From that time, it intends that the Sunshine Coast be primarily supplied from the Landers Shute and Noosa water treatment plants. These supplies will be augmented by supply from the Ewen Maddock Water Treatment Plant and Northern Pipeline Interconnector during peak demand periods and when supply from the other plants is constrained, including due to maintenance or poor raw water quality.

Once the connection is commissioned, this mode of operation will be reflected in the subsequent versions of the annual operations plans and all subsequent Grid Instructions.

Once supply is no longer required, the Image Flat Water Treatment Plant could be decommissioned, avoiding fixed operating costs and deferring the need for the proposed capital expenditure.

The Water Grid Manager forecasts that supply from the Image Flat Water Treatment Plant will not be required until around the year 2025, based on high growth demand forecasts and taking into account regional water security. We will monitor this requirement and provide advice to Seqwater each year.

The Water Grid Manager notes that a decision to decommission the Image Flat Water Treatment Plant will have no material impact on water security over the short or long term. To comply with our obligations under the System Operating Plan, we do not need the water supply yield from the South Maroochy River over the short to medium term.

In relation to system reliability, the Water Grid connection will provide a higher level of reliability than currently provided as a stand-alone supply. Water quality risks would change, but remain below the tolerable risk threshold.

The Water Grid Manager provided this advice to Seqwater during planning discussions for the Image Flat Water Treatment Plant during 2011.

5.5 Molendinar and Mudgeeraba water treatment plants

Seqwater has proposed upgrades to the Molendinar and Mudgeeraba water treatment plants to be undertaken over 2012–13 to 2014–15, at an estimated combined cost of $22.9 million. The submission to the Queensland Competition Authority states that the scope of the Molendinar Water Treatment Plant upgrade is a backwash pump. The scope of Mudgeeraba Water Treatment Plant upgrade is a 20 ML storage. The submission states that these upgrades are required for compliance purposes, but does not provide any further information.

The Water Grid Manager considers that the current treatment capacities of the Molendinar and Mudgeeraba water treatment plants are adequate, based on this mode of operation. It does not foresee a requirement to increase those capacities at any time in the foreseeable future. It notes that the combined treatment capacity of the two plants exceeds both the entitlement, and average Level of Service contribution from Hinze Dam.

In operating the Water Grid, we will continue to use the Molendinar and Mudgeeraba water treatment plants as the primary sources of supply for the Gold Coast region and to the Southern Regional Water Pipeline, as summarised in Section 3. This supply will continue to be augmented by the Gold Coast Desalination Plant during peak demand periods, and when supply from the other plants is constrained, including during maintenance. When appropriate, it will also be augmented by supply from central South East Queensland via the Southern Regional Water Pipeline.

The Water Grid Manager notes that population growth may cause the capacity of the Molendinar and Mudgeeraba water treatment plants to be exceeded, as was flagged in the *2010–11 Annual Market Rules Review* and the 18 January 2012 advice to the Queensland Water Commission. However, to the extent that this occurs, the additional or excess demand will be supplied from alternative supplies operating within their existing capacity.

In relation to water quality, the Water Grid Manager notes that the Seqwater submission refers to "changes to certain water quality parameters". To clarify, these statements refer to a trial of increased disinfectant dosing rates that was requested by our customer, Allconnex Water. The increased dosing rates are being delivered using existing infrastructure. The trial has not yet confirmed a need for the change to take place on a permanent basis, or that capital expenditure would be required to maintain the dosing rates that are currently being delivered from existing infrastructure.

The Water Grid Manager also notes that a total of $2.7 million of other works is proposed to be completed at the two water treatment plants in 2012–13. It understands that some of these works will address operational issues identified by Allconnex Water in relation to excessive pressures and fluoridation at the M04 Pump Station at the Molendinar Water Treatment Plant complex. With that exception, the Water Grid Manager does not have sufficient information to comment on the need for these other works.

5.6 Canungra Water Treatment Plant and off-stream storage

At Canungra, Seqwater has proposed to construct an off-stream storage, at an estimated cost of $4.3 million, and to upgrade the Canungra Water Treatment Plant, at an estimated cost of $1.2 million. The works are proposed to be undertaken between 2011–12 and 2015–16, with expenditure of $1.4 million in 2012–13.

The proposed capital expenditure presupposes the outcomes of a planning study that is being undertaken for Canungra and Beaudesert, led by the Queensland Water Commission and involving all relevant stakeholders. The Water Grid Manager considers that planning investigations in relation to whether the preferred option is either a pipeline connection to the grid or a local water treatment plant should be concluded, and a preferred strategy for servicing the Canungra and Beaudesert townships agreed by all parties, prior to any significant capital expenditure being undertaken.

The Water Grid Manager notes that the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012, states that Seqwater would await the outcome of the planning process before then making appropriate determinations regarding its assets. However, Seqwater also states that it may determine that expenditure is required due to issues associated with asset condition or the meeting of peak demand capacities as differentiated from average demand.

The Water Grid Manager notes that it has undertaken a demand assessment for the purposes of the planning study, including of peak demand. The results of that assessment were provided in its previous advice to Seqwater and the Queensland Water Commission, including in our document entitled *Beaudesert and Canungra: Service Specifications* (see **Attachment 6**).

That assessment highlighted that demand at Canungra is highly uncertain, with annual growth projections of between 5–15% from a base population of 740 people or approximately 300 connections. To achieve these growth rates, in the order of 15 to 50 new connections would be required each year. However, recent consumption trends have been negative, with the actual number of new connections is currently closer to zero. While a subdivision has been approved that has the potential to almost double the population, construction work has not yet commenced and as such the take up rate is currently unknown.

On that basis, we consider that it would be prudent to adopt a staged approach to any upgrade of the water treatment plant, with the initial upgrade triggered by:

- demand being consistently above 0.22 ML per day on a rolling year average
- the number of new connections in a rolling year average exceeding 10 per year.

In relation to water security, should a local water treatment plant be the preferred strategy, then an off-stream storage will be required at some time in the future. The scale and timing of this expenditure must be considered in detail. At current demands, supply can be maintained by water carting, in combination with ceasing standpipe supplies to non-reticulated users. These measures were trialled in 2009 but not required.

The planning study is also likely to highlight that local reservoir storage capacity is inadequate, and that Queensland Urban Utilities should increase local storage volume regardless of the long term bulk water solution.

5.7 Beaudesert Water Treatment Plant

Seqwater proposes to upgrade the Beaudesert Water Treatment Plant at an estimated cost of $9.0 million, with $2.5 million to be undertaken in 2012–13. The submission to the Queensland Competition Authority states that the capital expenditure relates to an upgrade of the plant for compliance purposes, including raw water infrastructure.

The proposed capital expenditure presupposes the outcomes of a planning study that is being undertaken for Canungra and Beaudesert, led by the Queensland Water Commission and involving all relevant stakeholders. The Water Grid Manager considers that planning investigations in relation to whether the preferred option is either a pipeline connection to the grid or a local water treatment plant should be concluded, and a preferred strategy for servicing the Canungra and Beaudesert townships agreed by all parties, prior to any significant capital expenditure being undertaken.

In either case, the Water Grid Manager does not consider that there is a need for expenditure in 2012–13 to make additional capacity available, based on current demand and information made available through the planning process. We also consider any bulk water supply works should be triggered based on actual demand, enabling work to be staged. This would enable the deferral of major capital expenditure for as long as possible to enable actual growth rates to be more accurately assessed.

The Water Grid Manager notes that the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012, states that Seqwater would await the outcome of the planning process before then making appropriate determinations regarding its assets. However, Seqwater also states that it may determine that expenditure is required due to issues associated with asset condition or the meeting of peak demand capacities as differentiated from average demand.

The Water Grid Manager notes that it has undertaken a demand assessment for the purposes of the planning study, including of peak demand. The results of that assessment were provided in its previous advice to Seqwater and the Queensland Water Commission, including in our document entitled *Beaudesert and Canungra: Service Specifications* (see **Attachment 6**).

We note that our previous assessments identified the potential for raw water quality risks. We understand that some limited capital expenditure may be required in 2012–13 to reduce those risks until the planning study is concluded, without increasing treatment capacity to more than 4 ML per day. However, we also note that the those risks have not been reflected in subsequent planning reports or in the results from water quality testing undertaken over the last 18 months – including during the major flooding events of January 2011.

5.8 North Stradbroke Island Water Treatment Plant

Seqwater has proposed to undertake about $4.6 million of upgrades to the North Stradbroke Island Water Treatment Plant, including about $4.1 million for the lime system and sludge lagoon. There is no reference to these works being required in 2012–13 in the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012.

The Water Grid Manager endorses any works required to maintain the ability to consistently access its full entitlement from the borefield. In relation to Herring Lagoon, it recommends that no major expenditure occur until the future role of the supply is agreed by all parties, including both the scope of any required works and the timing of those works. Based on information provided, this would appear to include the proposed lime system and sludge lagoon.

As background, the North Stradbroke Island Water Treatment Plant is a critical water treatment plant, providing base load supply for use in the Redlands and Cleveland demand zones and for transfer west through the Eastern Pipeline Interconnector.

The North Stradbroke Island Water Treatment Plant accesses water from a number of bores, as well as surface water from Herring Lagoon. Water from Herring Lagoon is typically high in colour and turbidity due to vegetation tannins leeching into the water, particularly after rainfall events. High colour and turbidity makes this water more costly and complicated to treat than water taken from the borefields. Specifically:

- Treatment of water from Herring Lagoon typically involves the use of the dissolved air flotation unit. Water sourced from the borefields generally only requires pH correction and disinfection.
- The Herring Lagoon Water Treatment Plant has two sludge pools to dry the sludge that comes from the treatment process when sourcing water from Herring Lagoon, which requires the use of a coagulant. This sludge, once dried, needs to be transported off the Island for disposal with associated operational costs and environmental impacts. Sludge volumes increase with production.

The Water Grid Manager, Queensland Water Commission and Seqwater are reviewing the future role and function of the Herring Lagoon source, in consultation with the Department of Environment and Resource Management. Key considerations include the costs of increasing the take from the lagoon, compared to alternative supplies.

5.9 Capalaba Water Treatment Plant

Seqwater has proposed that the Capalaba Water Treatment Plant be upgraded in two stages, both to be completed between 2011–12 and 2015–16. The estimated cost of the works is $15 million, of which $10 million is Stage 1.

The submission states that scope is upgrade works. In its interim statement that was provided to the Queensland Water Commission on 28 February 2012, Seqwater stated that this project will address the key drivers of maintenance renewals and water quality compliance for trihalomethanes.

The Water Grid Manager submits that this capital expenditure is not required at this time, based on information that it currently holds.

The Capalaba Water Treatment Plant was designed to treat up to 52 ML per day. However, production is currently limited to around 18 ML per day due to instrumentation limitations and the need for manual operation. In addition, there have been instances of elevated turbidity and disinfection by-products in treated water during wet weather.

The system can be operated around these constraints over the short to medium term. Supply from the Capalaba Water Treatment Plant will continue to be minimised, with the majority of water supplied to the Redlands area being sourced from the North Stradbroke Island Water Treatment Plant, due to its superior raw water quality. This is the dominant operating mode under the existing Annual Operations Plan.

As background, the Water Grid Manager undertook an investigation into disinfection by-product issues in the Redlands demand zone in 2011, in partnership with Seqwater and relevant Grid Participants. A number of largely operational improvements have since been implemented, including blending with alternative supplies and reservoir management by LinkWater and Allconnex Water.

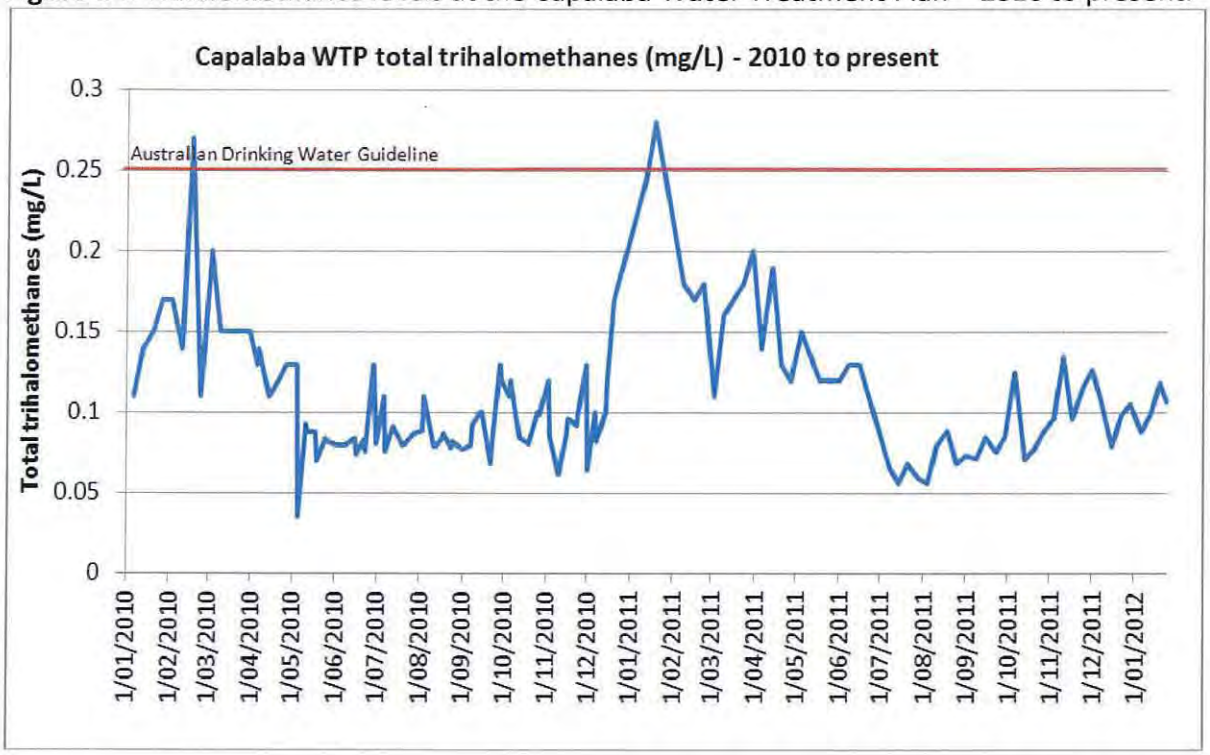
Also as an outcome of that investigation, the Water Grid Manager wrote to Seqwater on 23 December 2011 (see **Attachment 7**). Relevantly, that letter sought that the Capalaba Water Treatment Plant:

- by 2016, be capable of supplying average day demand of 7–14 ML and mean day maximum month demand of 14–30 ML
- limit trihalomethanes levels to less than 185 milligrams per litre, 95% of the time (compared to the contractual requirement of 250 milligrams per litre).

The letter stated that, due to available storage in the area and ability to supply from other sources, we understand that this plant may cease operation for up to a week based on raw water triggers to minimise treated trihalomethanes levels above 185 milligrams per litre. It noted that this would enable the water treatment plant to be turned off when raw water exceeds 40NTU for turbidity, as recommended by Water Strategies. It also noted that discussions with Seqwater had indicated that water treatment plant is currently capable of the above.

The improvements implemented by LinkWater, Seqwater and Allconnex Water have proven to be effective over the 2011–12 wet season, including during a number of poor raw water quality events. As illustrated in **Figure 14**, there have been no exceedences of target values for THMs from the Capalaba Water Treatment Plant over that period.

Figure 14: Trihalomethanes levels at the Capalaba Water Treatment Plan – 2010 to present.



In time, the Capalaba Water Treatment Plant will need to be made more reliable, due to demand growth and to maintain supply during periods of poor raw water quality. The key constraint is the transfer capacity from Heinaman Road reservoirs to Alexandria Hills reservoir, which dictates that an initial upgrade occur when average demand in the Redlands area approaches 44 ML per day. This trigger is not forecast to be reached for at least five years, from current average demand of 34 ML per day.

In the meantime, we consider that any upgrades for trihalomethanes compliance should only be undertaken once the above operating strategies have been demonstrated not to be effective and once all of the options recommended by the investigation have been considered in detail.

We note that, following the investigation, the Water Grid Manager was involved in early discussions with Seqwater and other parties about maintenance requirements for the Capalaba Water Treatment Plant and the scope of future upgrades. At those discussions, it was agreed that a sub-regional supply strategy was required in this area prior to any capital expenditure being undertaken. This is still the view of the Water Grid Manager.

5.10 Gold Coast Desalination Plant

Seqwater has proposed to undertake upgrades of the Gold Coast Desalination Plant to enable "autoflush of SAF pumps and headers", at a cost of $1.98 million. There is no reference to these works being required in 2012–13 in the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012.

The Water Grid Manager requires further information before it can comment on the need for this expenditure.

The desalination facility is required to continue operations in stand-by mode. While maintaining availability, expenditure on upgrades should be minimised.

5.11 Purified recycled water supply

Seqwater has allowed $0.8 million for the construction of a connection to the BP refinery and $0.3 million for the construction of treated water storage at the Gibson Island Advanced Water Treatment Plant.

These projects are needed, provided that Queensland Urban Utilities finalise proposed contracts for supply of PRW to commercial and industrial customers. However, further costs should not be incurred until such time as those contracts are executed.

5.12 Lake Macdonald

Seqwater has proposed to undertake safety upgrades to Lake MacDonald, at an estimated cost of $25.8 million.

The safety upgrade is a regulatory requirement of the Department of Environment and Resource Management.

While not commenting on the need for improvements, the Water Grid Manager has recommended to Seqwater that the business case include options to lower the spillway. It noted that these options would reduce the supply yield and that the impacts of this would need to be discussed with the Queensland Water Commission.

The information provided does not explain whether this option has been considered.

As background, the Water Grid Manager holds an entitlement to take 3,500 ML from this dam. It contributes about 2,600 ML per annum of the overall system yield of 485,000 ML per annum, measured on a Levels of Service basis. The actual contribution depends upon the operating strategy in place at any specific time.

By lowering the spillway, it may be possible to defer much of the proposed capital expenditure until demand approaches system yield. This is forecast to occur between 2035 and 2041, based on the low demand forecast and depending upon the impact of climate change (refer Section 3.2). At that time, the dam could be reinstated to the current level or the next supply brought forward by about six months.

Lake MacDonald supplies water to the Noosa Water Treatment Plant, which is also supplied from the Mary River system.

5.13 Wyaralong Water Treatment Plant and associated infrastructure

The Government has announced that the Wyaralong Water Treatment Plant will be constructed from 2014–15. This commitment is reflected in the Seqwater submission, which proposes to undertake $2 million of detailed design over 2012–13 and 2013–14.

On this basis, the Water Grid Manager recommends that Seqwater and LinkWater seek clarification of project timing from the Government prior to undertaking any further planning for the Wyaralong Water Treatment Plant or Kuraby Interconnector.

The Water Grid Manager considers that the Wyaralong Water Treatment Plant and associated infrastructure is not required over the short to medium term, due to ongoing water efficiency and other storages being full or near full. It considers that it could be deferred until around 2024–25, depending upon actual demand growth.

5.14 Kilcoy Water Treatment Plant

The Seqwater submission reflects that an upgrade of the Kilcoy Water Treatment Plant is underway, at an estimated total cost of $16.1 million.

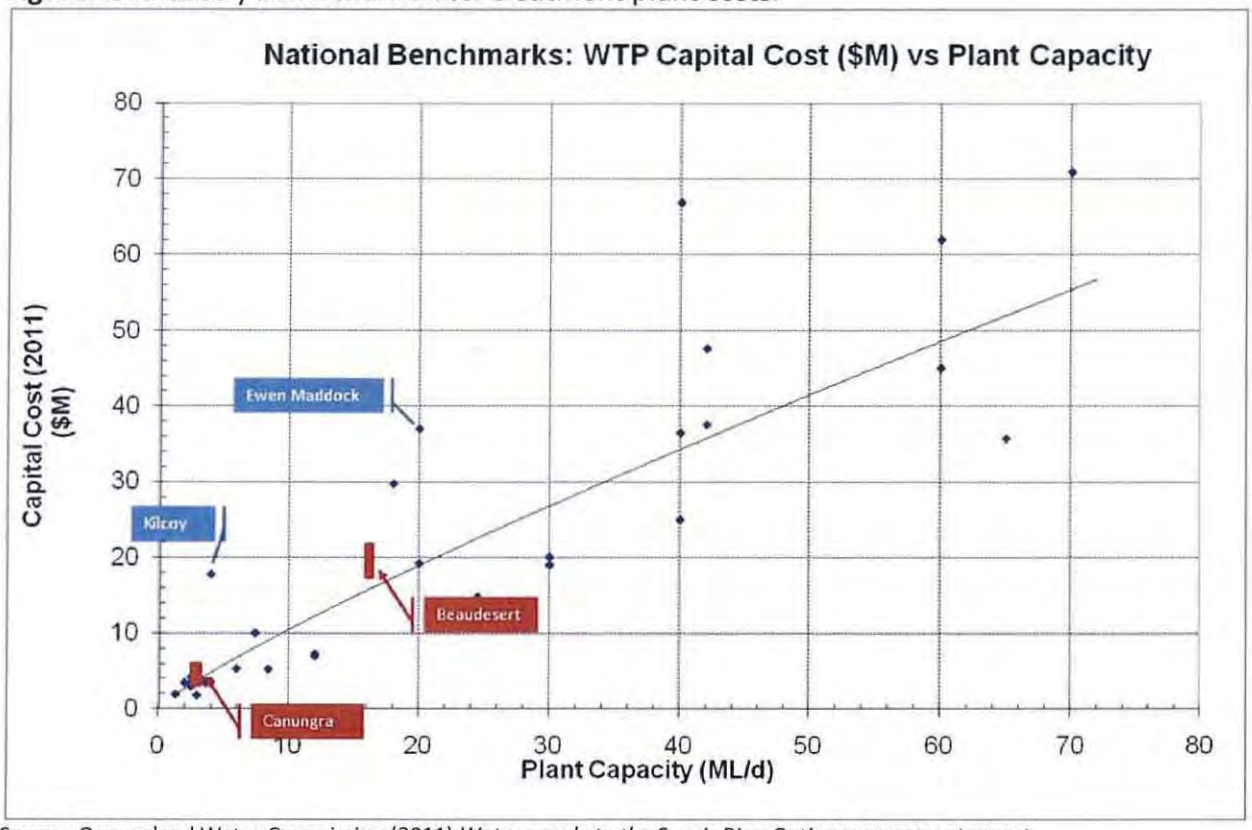
The Water Grid Manager has previously provided advice about this project to Seqwater, the Queensland Competition Authority and the responsible Minsters. That advice remains extant. In summary, the Water Grid Manager:

- agreed that improvements to the existing supply are required in order to meet its contractual obligations
- noted that the project cost appears to be high, compared to benchmark rates for similar water treatment plants
- noted that the project specifications are more stringent that what is required under its Grid Contract with Seqwater or, to the best of its knowledge, a direction from the Office of the Water Supply Regulator
- recommended that the upgrades to the Kilcoy Water Treatment Plant be deferred by three months to enable a more fulsome comparison with a pipeline option
- requested urgent advice as to the risks associated with such a delay.

The upgrade was considered by the Queensland Competition Authority in its 2011–12 determination, which stated that the Authority encouraged Seqwater to instigate further discussions with the Water Grid Manager regarding the prudency of the Kilcoy Water Treatment Plant project. The Authority noted that the Kilcoy Water Treatment Plant is not to be commissioned until 2013–14 and therefore had no immediate impact on the recommendation of 2011–12 Grid Service Charges.

The recommended discussions have not occurred, and no further information or advice has been provided about the concerns raised. However, we note that information provided by Seqwater as part of a separate planning process reflects that the Kilcoy Water Treatment Plant is more expensive than benchmark industry rates (see **Figure 15**, comments in original).

Figure 15: Industry benchmark water treatment plant costs.



Source: Queensland Water Commission (2011) *Water supply to the Scenic Rim: Options assessment report.*

5.15 Boonah-Kalbar Water Treatment Plant

Seqwater has proposed to upgrade the Boonah-Kalbar Water Treatment Plant at an estimated total cost of $9.3 million, to be undertaken from 2012–13 to 2014–15. The submission states that these upgrades are required for compliance purposes, but does not provide any further information.

This project is referred to in the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012. That statement includes advice that the project will address the key drivers of water quality and supply reliability, and peak capacity demands. It also states that total costs are estimated to be $5.3 million.

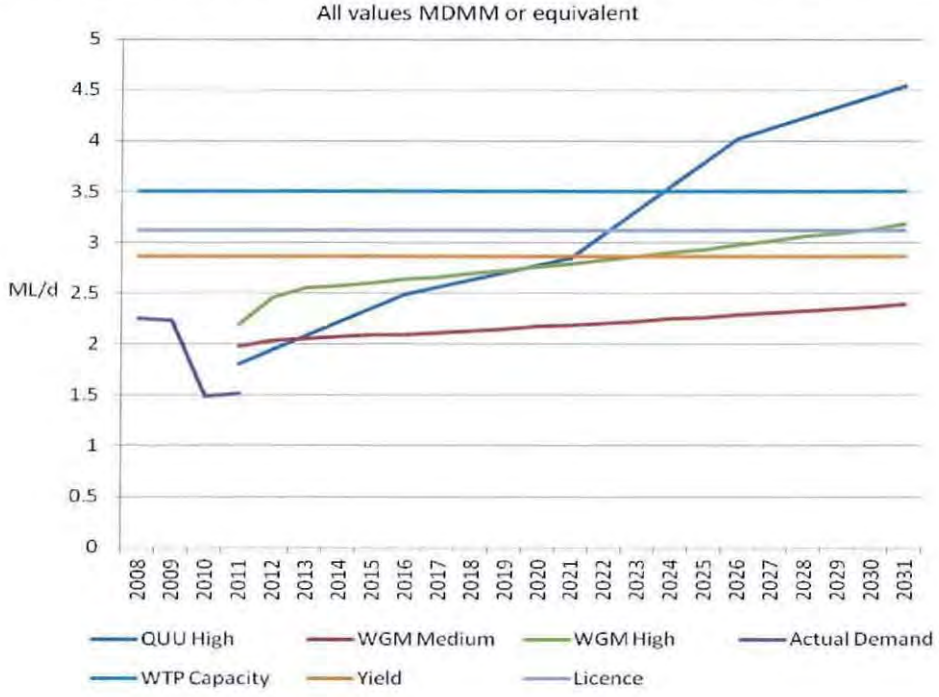
The Water Grid Manager recommends, based on current information, this capital expenditure is not required at this time.

The existing treatment capacity of 3.5 ML per day exceeds forecast demand over the short to medium term. For comparison, the forecast annual requirement for 2011–12 is 632 ML (about 1.7 ML per day). The mean day maximum month demand is about 50% of available treatment capacity.

Augmentation options should be investigated for delivery when required. The trigger to undertake those works should be when average annual demand exceeds around 3 ML per day equivalent, depending upon the preferred option. This is not expected until 2021 at the earliest, for 2024 implementation. **Figure 16** illustrates the impact of alternative demand scenarios upon the need for upgrades.

There are no known water quality or reliability issues at the Boonah-Kalbar Water Treatment Plant.

Figure 16: Predicted demand and supply (mean day maximum month or equivalent).



5.16 Lowood Water Treatment Plant

Seqwater has proposed to undertake sludge handling improvements and other works at the Lowood Water Treatment Plant, at an estimated combined cost of $3.3 million. The works are proposed to be undertaken in 2012–13 and 2013–14. The submission states that these upgrades are required for compliance purposes, but does not provide any further information. There is no reference to these works being required in 2012–13 in the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012.

The Water Grid Manager recommends that further information is required to demonstrate the need for this expenditure.

The treatment capacity of the Lowood Water Treatment Plant exceeds forecast mean day maximum month demand to the year 2031, and potentially beyond. Average day demand is about 7 ML per day, compared to the treatment capacity and entitlement of 20 ML per day.

If sludge handling improvements are shown to be required due to environmental legislation or to maintain supply, the equipment should be sized for no more than the predicted average demand at 2031 of 8.4 ML per day based on medium growth.

There are also no known water quality or reliability issues.

5.17 Kooralbyn Water Treatment Plant

Seqwater has proposed to undertake $1.85 million of upgrades to the Kooralbyn Water Treatment Plant, including $1.15 million for sludge handling and $0.5 million for a clarifier. The submission states that these upgrades are required for compliance and service purposes, but does not provide any further information. There is no reference to these works being required in 2012–13 in the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012.

The Water Grid Manager recommends that further information is required to demonstrate the need for this expenditure.

In relation to the clarifier, the Water Grid Manager recognises that these works may be required to address water quality risks. It understands that the risks identified at the Kooralbyn Water Treatment Plant are similar to those faced in the Beaudesert Water Treatment Plant, however on a slightly different scale due to the location within the catchment.

These water quality risks were highlighted by the Water Grid Manager in its *2010–11 Annual Market Rules Review* and 18 January 2012 advice to the Queensland Water Commission. As noted in that advice, the risks related to the presence of protozoa for which, in the absence of detailed guidance, Seqwater has taken a conservative approach. The actual risk should be further quantified through detailed water quality monitoring prior to major capital investments being undertaken.

In relation to the sludge handling, if improvements are shown to be required due to environmental legislation or to maintain supply, then the equipment should be sized for no more than the predicted average demand of 2031 of 1.2ML per day (based on medium growth). For comparison, the forecast production requirement for 2011–12 is 168 ML (less than 0.5 ML per day). The stated capacity of the existing water treatment plant is 1.9 ML per day.

The Water Grid Manager will continue to monitor forecast demand against existing treatment capacity, consistent with its *2010–11 Annual Market Rules Review* and 18 January 2012 advice to the Queensland Water Commission.

In relation to reliability, sufficient reticulation storage needs to be maintained to ensure reliability during emergency events as well as regular raw water disruptions.

5.18 Rathdowney Water Treatment Plant

Seqwater has proposed to undertake $0.7 million of upgrades to the Rathdowney Water Treatment Plant, including $0.65 million for sludge handling. The submission states that these upgrades are required for compliance and improvements, but does not provide any further information. The interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012, states that budget will be provided to undertake a planning study for this water treatment plant in 2012–13, but includes no reference to upgrades also being required.

The Water Grid Manager recommends that further information is required to demonstrate the need for this expenditure.

The existing treatment capacity of the Rathdowney Water Treatment Plant of 0.4 ML per day exceeds forecast requirements over the next three to five years. For comparison, the forecast production requirement for 2011–12 is 24 ML, which is equivalent to less than 0.07 ML per day. The mean day maximum month demand is about 23 percent of available treatment capacity.

If sludge handling improvements are shown to be required due to environmental legislation or to maintain supply, then the equipment should be sized for no more than the predicted average demand in 2031 of 0.2 ML/day (based on medium growth forecasts).

The Water Grid Manager will continue to monitor forecast demand against existing treatment capacity, consistent with its *2010–11 Annual Market Rules Review* and 18 January 2012 advice to the Queensland Water Commission.

Previous advice also highlighted the need for sufficient reticulation storage to be maintained to ensure reliability during emergency events as well as regular raw water disruptions. Specifically, the Water Grid Manager understands that Allconnex Water may need to upgrade the existing service reservoir.

5.19 Jimna Water Treatment Plant

Seqwater proposes to $1.9 million of upgrades to the Jimna Water Treatment Plant, in 2012–13 and 2013–14. The submission states that these upgrades are required for compliance purposes, but does not provide any further information. There is no reference to these works being required in 2012–13 in the interim statement from Seqwater to the Queensland Water Commission, dated 28 February 2012.

The Water Grid Manager recommends that further information is required to demonstrate the need for this expenditure.

The Water Grid Manager understands that this plant has had operational improvements made since Seqwater took ownership of it, resolving many of the initial water quality issues. The Water Grid Manager is not aware of any water quality or supply issues since these improvements were undertaken.

In relation to capacity, current annual demand is about 13 ML (0.04 ML/day). Treatment capacity is 0.2 ML per day.

6 Other matters

6.1 Water treatment plant performance specifications

We continue to be concerned that the project specifications for new water treatment plants are more stringent than what is required under our Grid Contract with Seqwater. We are concerned that these specifications may impact on the cost of those projects.

We raised these concerns in our advice to Seqwater about the proposed Kilcoy Water Treatment Plant, in a letter dated 7 June 2011. That letter stated:

> *"...we note that the project specifications are more stringent than what is required under our Grid Contract with Seqwater, and query whether this may have impacted on the cost. We would like to understand the reasons for requiring more stringent specifications. We also note that that there has been no agreement to more stringent contract water quality requirements or, to the best of our knowledge, a direction from the Office of the Water Supply Regulator, Department of Environment and Resource Management.*
>
> *For example, we note that the project specification requires that treated water turbidity be below 0.1 NTU on a 95 percentile basis, with a limit of 0.3 NTU. By comparison, the Australian Drinking Water Guidelines 2004 sets a turbidity limit of less than 5 NTU, and recommends that treated water has a turbidity of <1 NTU for disinfection purposes. The project specification is also higher than levels at other treatment plants across the SEQ Water Grid, where turbidity has been included as an additional parameter, for example at the Landers Shute Water Treatment Plant you are required to exercise best endeavours to achieve treated water quality turbidity of ≤0.3 NTU on a 95th percentile basis and a limit of 0.5 NTU.*
>
> *We also note that these specifications must be achieved with raw water turbidity of up to 500 NTU and with the plant operating at full capacity (4ML/day).*
>
> *This requirement appears to be conservative, given that the capacity of the proposed water treatment plant exceeds forecast demand in 2030, and that poor raw water quality typically occurs following periods of high rainfall, meaning that it is unlikely to coincide with peak demand."*

We have not received any advice as to the reasons for the difference. We are concerned that similar specifications have since been used for other projects, including as part of the planning study for Beaudesert and Canungra.

The Water Grid Manager accepts that there may be sound reasons to set specifications that are more stringent than those contained in the Grid Contract, either on a case specific basis or for all new water treatment plants. It also acknowledges that more stringent specifications may sometimes be able to be delivered at no additional cost. However, it believes that the incremental benefits and costs of these more stringent specifications needs to be quantified and justified, and subject to both independent review by the Authority and discussion with the Water Grid Manager.

We note that the 2011 version of the Australian Drinking Water Guidelines has been released since this advice was provided and that the filtered water turbidity limits in the 2011 version and lower than in the 2004 version. However, we also note that those revised limits are still higher than Seqwater proposal and that this is only one of a number of differences.

6.2 SCADA

LinkWater and Seqwater propose to expend a combined total of more than $48 million on SCADA systems over the period from 2011–12 to 2016–17.

In 2012–13, LinkWater proposed to expend $2.8 million to continue implementation of the SCADA implementation project. The total cost of that project is $10.5 million, based on its 2011–12 submission to the QCA.

Also in 2012–13, Seqwater proposes to complete Stage 2 of SCADA early works at a total cost of $2.1 million. It also proposes to commence implementation of the business case, at a forecast cost of $35.8 million over five years. A number of related projects are also proposed, including $1.46 million in 2011–12 and 2012–13 for remote SCADA access. In addition to SCADA, Seqwater proposes to undertake $17.8 million for business driven projects for operations purposes.

The Water Grid Manager considers that there is a clear need for improved data sharing across Grid Participants. It considers that a well managed SCADA system is essential to effective operation of the Grid, including in order to optimise the operation of existing assets and to mitigate any risks associated with the deferral of proposed capital upgrades.

We also acknowledge there is a need to upgrade existing systems. These systems were inherited from various previous Council owners and alliances. These systems run diverse SCADA software applications, are supplied and maintained by multiple different suppliers, have diverse and inconsistent functionality, and are not effectively integrated. For example, LinkWater has previously identified that the existing SCADA systems:

- lack the security and resilience demanded for the management of critical infrastructure
- have limited and unsatisfactory functionality to meet contemporary operational, management and regulatory needs
- have a highly inconsistent and hence inefficient user interface, with significant limitations in its ability to interface with other LinkWater systems and those of LinkWater's Grid Participants.

While necessary, we note that the efficiency with which these needs are met, including the optimal systems solution and timing, is a matter for the Queensland Competition Authority.

In that regard, we note that cost savings may be able to be achieved through coordination between the two entities, such as by sharing communication equipment. It provided advice to this effect to the Minister for Energy and Water Utilities in April 2011. To date, there has been good cooperation between the entities and some minor savings achieved.

6.3 Future projects

Seqwater flags expenditure of $12 million per annum for future projects, for four years from 2013–14 to 2016–17. No detail or justification is provided for these amounts.

Without such information and demonstration of their need, we are unable to comment further.

6.4 Staging of works

Seqwater proposes to undertake a range of other projects in 2012–13. We cannot comment on the need for these projects. However, consideration might be given to whether these works could reasonably be staged over several years.

Attachment 1: Relevant documents

The submission draws upon a range of Water Grid Manager documents, as described below.

- *SEQ Water Grid Quality Management Plan* (Water Grid Quality Management Plan), as required by section 5.3 of the Market Rules SEQ Water Market (Market Rules). The Water Grid Quality Management Plan coordinates the management of water quality in South East Queensland. This plan includes an assessment of the risks associated with each of more than 80 potential operating modes, among other things.

  This submission relates to the version of the Water Grid Quality Management Plan that was submitted to the Queensland Water Commission on 9 December 2011.

- *SEQ Water Grid Annual Market Rules Review* (Annual Market Rules Review), as required by section 3.6 of the Market Rules. The Annual Market Rules Review includes an assessment of additional capacity that may be required over the next five years, in order to meet forecast demand.

  The submission relates to the *2010–11 Annual Market Rules Review*, which was submitted to the Queensland Water Commission on 30 September 2011. A relevant extract from that report forms **Attachment 3**. A more comprehensive capability statement was completed and submitted to the Queensland Water Commission in early 2011.

- *SEQ Water Grid Emergency Response Plan* (Emergency Response Plan), as required by section 4.24 of the Market Rules. The Emergency Response Plan directs a coordinated effective response in the event of an incident, which meets the Water Grid definition of an emergency.

  The submission relates to the 2011 version of the Emergency Response Plan, as approved by the relevant Minister on 12 October 2011. It also relates to emergency response plans prepared in late 2011 for critical emergencies, including supply interruption and water quality.

- Advice provided to and from the Water Grid Manager about a Consolidated SEQ Water Demand Forecast, as required by Schedule 5 section 2 of the System Operating Plan. The Water Grid Manager was required to prepare a consolidated SEQ water demand forecast and identify and describe any critical matters that may have a material impact on the requirements for new or upgraded bulk water supply works in 2012–13.

  The submission particularly relates to advice from the Water Grid Manager to the Queensland Water Commission on 18 January 2011, made in accordance with Schedule 5, Section 5(b) of the System Operating Plan. It also has regard to the responses to that advice, from LinkWater on 2 March 2012 and Seqwater on 28 February 2012. These three documents are included at **Attachment 4**.

The submission also has regard to the forthcoming *SEQ Water Grid Manager 20-year Operating Strategy* (20-year Operating Strategy). The 20-year Operating Strategy demonstrates how we plan to manage and operate the Water Grid to meet Grid Customer supply requirements into the future. Among other matters, the 20-year Operating Strategy will:

- assess probable customer demand forecast scenarios taking into consideration a range of climatic factors and regional growth projections
- outline the short and longer term operating strategy, including identification of triggers that result in changes to a particular Water Grid operating mode and taking into consideration the cost implications associated with each mode
- assess the treatment, transport, and infrastructure capacity that we will require from Grid Service Providers in order to comply with our contractual and regulatory obligations
- identify Grid capability gaps and areas of the Water Grid that may potentially require increases or decreases to service requirements for further detailed investigation.

Attachment 2: Methodology

The Annual Operations Plan and the 20-year Operating Strategy are developed through a four step process, as illustrated in **Figure 2** and summarised below.

Step 1: Forecast demand

The first step involves the preparation of demand scenarios, based on the forecasts provided by Grid Customers and other considerations. Multiple scenarios are prepared, including likely low and high series forecasts. The scenarios:

- are prepared for each demand zone, with summaries for each subregion and for the Water Grid as a whole
- take into account seasonal variation and peak periods, in order to ensure that sufficient capacity is available at all times
- take into account potential drought rebound scenarios
- allow for planned developments.

To take into account the variability of demand over a time scale relevant to bulk supply infrastructure, a mean day maximum month peaking factor has been applied.

An explanation of current and assumed peaking factors is contained in our document entitled *2009–10 Annual Market Rules Review (Part 2): Capability Assessment Report*.

Step 2: Determine Water Grid capacity and availability

The second step is to determine system capacity over the forecast period, based on current storage levels, the capacity assessment and notices and the timing of committed augmentations.

This submission is based on asset capabilities as described in our document entitled *2010–11 Annual Market Rules Review*.

Water Grid capacity is influenced by previous versions of the Annual Operations Plan and 20-year Operating Strategy. For example, a decision by Seqwater to demobilise a small or aged supply will result in that facility not being immediately available.

Step 3: Optimise security and cost

First and foremost, the System Operating Plan seeks to maintain water security. It achieves this through the specification of level of service objectives, risk criteria and operating rules, as outlined in Section 2.2. The System Operating Plan also requires that the most cost-efficient option be taken at any point in time in order to achieve this security.

These requirements are addressed as part of the third step, with the identification of dominant operating modes at the regional, subregional and demand zone level. This assessment has regard to:

- demand across the Water Grid and for each supply zone, including seasonal and peak demand (Step 1)
- asset capacity and availability (Step 2)
- variable operating costs, over the short to medium-term
- options to reduce or defer the need for capital expenditure, including by specifying that supply will not be required from specific assets over the short- to medium-term
- compliance with water resource plan requirements
- additional revenue
- potential water quality implications of the various supply options.

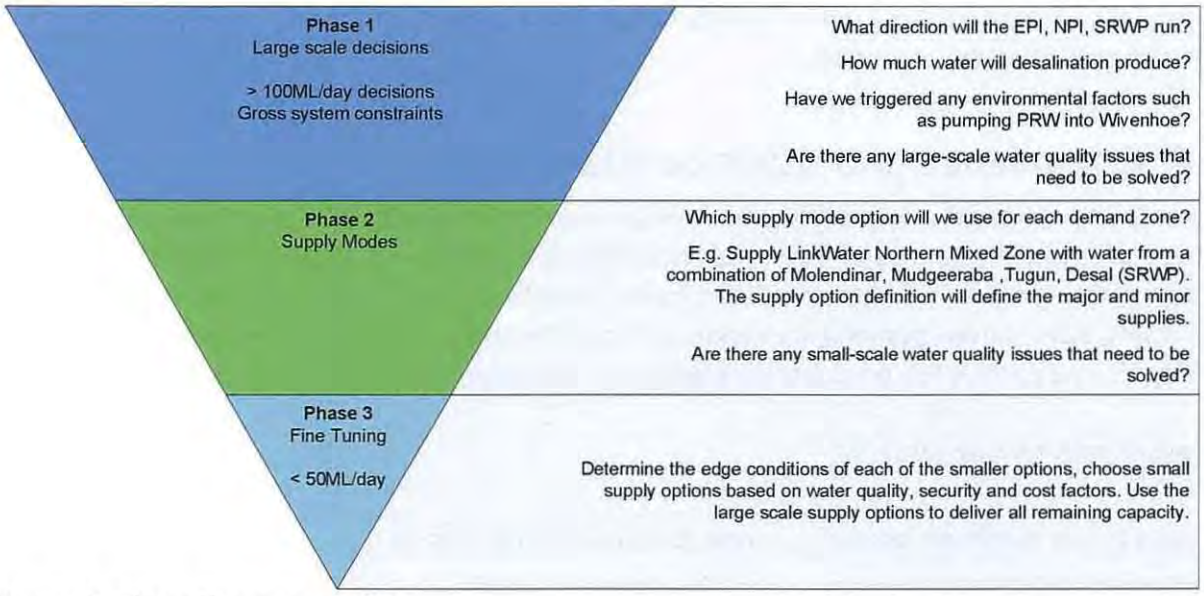


Figure 1: Three tier assessment

Within the connected Water Grid, we specify triggers to change the operating approach of key facilities. Variations may be required for a number of reasons, including:

- major changes to storage levels, including as a result to temporarily or permanently reduce the full supply level of key storages
- major changes to demand, both average and peak
- operating rules, such as for the Northern Pipeline Interconnector
- water quality issues, including for taste and odour.

Options are assessed as a portfolio, taking into account the costs and timeframes to bring capacity online as dam levels decline.

Capital deferral options are a key driver for the 20-year Operating Strategy, due to the magnitude of potential savings.

Other options to reduce the costs of operating the Water Grid include:

- selling water to irrigators or adjoining areas on an interruptible basis
- reducing the supply required from the generally more expensive small and aged supplies
- reducing the supply required from more expensive climate resilient supplies
- altering the rate of transfer required through major interconnections, should they require relatively high energy intensive activities
- reducing the capacity required from Grid assets, potentially enabling the asset owner to defer capital expenditure or to address water quality or reliability issues.

Sub-regional impacts are considered to ensure that regional security levels are achieved without placing a higher than desirable stress on a single subregion supply source. This subregional assessment will be used to formulate operating rules and triggers consistent with efficient and cost effective operation.

Step 4: Compliance and other considerations

The Water Grid provides the opportunity to manage some water quality and asset reliability risks across the system as a whole. These opportunities are considered as part of Step 4, once a proposed operating mode has been identified based on optimising for water security and cost considerations alone (given demand scenarios and capacity and availability). A range of other issues may also be considered on a case by case basis, such as impacts on energy consumption.

These considerations may result in:

- changes to the dominant operating mode (that is, redoing Step 3)
- additional or alternative triggers to vary the operating mode
- initiating detailed investigations.

In some cases, these changes will increase the cost of operating the Water Grid. Where this occurs, we consider that the benefit of the change exceeds the cost.

Health related issues are treated as an absolute constraint on the system. That is, if a particular operational response needs to be taken to ensure water delivered to customers will be 100% health compliant, then those operational responses are undertaken regardless of cost. System operations can manage health related issues by:

- not using particular water sources until capital or process improvements are undertaken
- maintaining minimum flows in major pipelines.

Aesthetic water quality issues are treated on a case by case basis, taking into account previous supplies, existing community expectations and the *Australian Drinking Water Guidelines 2004* values. This is achieved by balancing between the costs of production and transport and the benefits associated with alternative mitigating responses.

For aesthetic parameters, consistent with the Water Grid Quality Management Plan, the Operating Strategy seeks to ensure that water quality in any demand zone is no worse than what was delivered to the customers prior to the Water Grid being established. In many areas, quality has improved.

In relation to reliability, sufficient capacity must be available within the Water Grid to meet demand in the event that key assets failed. With the context of the Water Grid, the main issue of interest is the likelihood of an asset failing to an extent that demand cannot be met. Scenarios include:

- Unforeseen failures, such as a transformer explosion at a water treatment plant or a switchboard fire at a distribution pump station. Depending on circumstances such a failure might be equivalent to two days of water production.
- Foreseen partial failures, such as when temporary changes in raw water conditions reduce production rates. High dirt loads in the raw water supply associated with heavy rainfall events commonly has this impact.
- Bulk network failures, such as those associated with local power outages and mains bursts or when raw water conditions exceeds the treatment capacity at existing infrastructure, such as occurs at Mt Crosby water treatment plants in situations other than normal operation.

We have assessed impacts on system reliability using a system reliability model developed for this purpose, as well as on a case by case basis in consultation with Grid Service Providers. The model can assess multiple outputs at multiple levels of demand, including time to failure.

Reliability could be improved through a combination of planned redundancy or planned response, including the combined use of all available treated water storage. Planned redundancy includes power supplies, asset redundancy, additional storage and high condition assets. Planned responses include carting, critical spares and emergency curtailment.

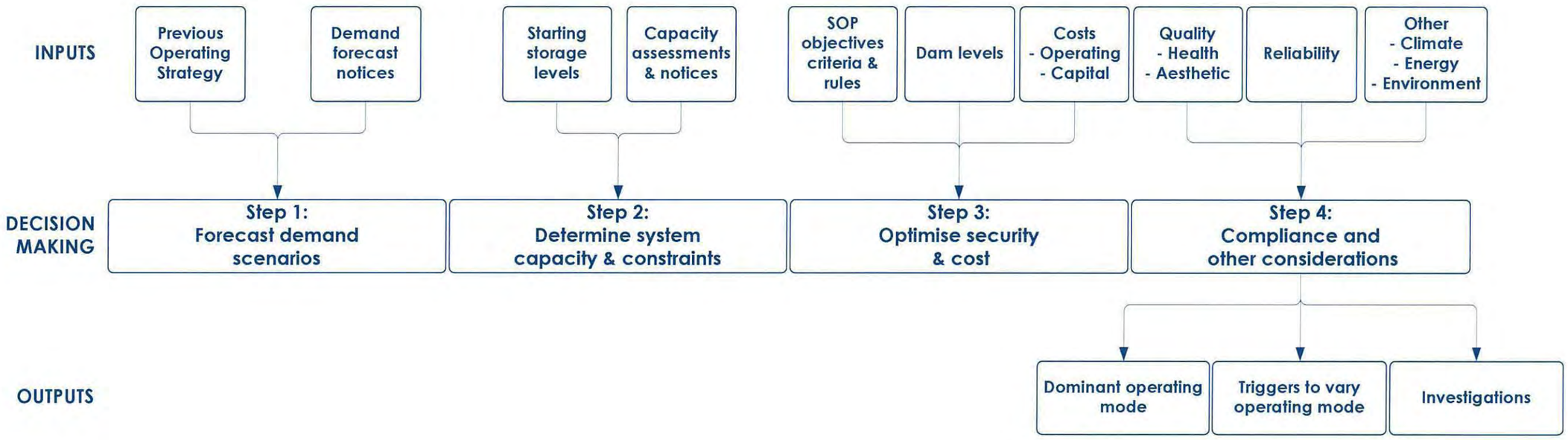


Figure 2: Operating Strategy inputs and decision making process

Attachment 3: Extract from 2010–11 Annual Market Rules Review

8.5 Summary of capacity constraints, reliability issues and actions

An overview of the existing or potential capacity constraints over the period to the end of 2015–16 is provided in **Table 11**. It does not include the water quality constraints to the Woorim Water Treatment Plant, which are addressed through the existing Operating Strategy (version 3).

This system assessment and actions draws upon the Grid Service Provider asset capability information contained in section 4.

Each identified system constraint has been assessed and categorised in accordance with the SEQ Water Grid Risk Management Plan and Risk Assessment Framework. The categories are provided to highlight our assessment of priority. The Risk Assessment Framework used for assessment of the risk rating for each recommendation forms **Appendix C**. The main categories of consequence that were generally relevant in defining the risk rating were the business continuity, legal and regulatory and the customer service categories. Consideration will be given to determine how best to reflect these risks in the risk register included in the SEQ Water Grid Risk Management Plan.

Table 11: Existing or potential capacity constraints to 2015–16

Asset	Constraint	Unmitigated risk		
		Likelihood	Consequence	Risk rating
Mt Crosby water treatment plants	Potential reliability constraints, subject to further investigation.	Likely	Major	High (16)
Beaudesert Water Treatment Plant	High water quality risks. Potential reliability constraint.	Likely	Moderate	High (12)
Kilcoy Water Treatment Plant	Supply potentially less than medium series demand in peak periods. Water quality and reliability constraints.	Likely	Moderate	High (12)
Maroochy demand zone, supplied from the Image Flat Water Treatment Plant	Depending upon operating mode, supply potentially less than medium series demand in peak periods.	Likely	Moderate	High (12)
Petrie Water Treatment Plant	Supply potentially less than high series demand in peak periods near the end of the projected demand forecast.	Likely	Moderate	High (12)
South Maclean Water Treatment Plant	Potential operational constraint, pending outcomes of water quality investigation.	Likely	Moderate	High (12)
Redland demand zone, including the Capalaba and North Stradbroke Island water treatment plants	Depending upon operating mode, supply potentially less than high series demand in peak periods. Potential operational constraint, pending outcomes of the trihalomethanes investigation.	Possible	Moderate	Medium (9)
Esk Water Treatment Plant	Supply potentially less than medium series demand in peak periods.	Likely	Minor	Medium (8)
Woodford Water Treatment Plant	Supply potentially less than medium series demand in peak periods. Potential reliability constraints.	Likely	Minor	Medium (8)
Amity Point Water Treatment Plant	Supply potentially less than the medium and high series demand in peak periods near the end of the projected demand forecast.	Possible	Minor	Medium (6)
Boonah-Kalbar Water Treatment Plant	Supply potentially less than high series demand in peak periods at around 2015–16.	Possible	Minor	Medium (6)
Canungra Water Treatment Plant	Supply potentially less than high series demand in peak periods at around 2014–15. Security below Level of Service, without augmentation by carting.	Possible	Minor	Medium (6)
Dayboro Water Treatment Plant	Security below Level of Service, without augmentation by carting. Potential water quality and reliability constraints.	Possible	Minor	Medium (6)
Kenilworth Water Treatment Plant	Supply potentially less than high series demand in peak periods near the end of the projected demand forecast.	Possible	Minor	Medium (6)

This section outlines proposed actions where potential gaps have been identified in the Grid Service Providers capability. In a similar approach to the Capability Assessment provided to the Queensland Water Commission in March 2011, the proposed responses are as follows:

- Grid Service Providers to monitor water quality issues.
- Track and revise demand forecasts – for constraints related to the availability of treatment capacity, forecasts should be refined in partnership with the relevant Distribution Retail Entities. This review may affect the amount of additional capacity required, or the timing of that capacity.
- Operational response – within the connected area of the Water Grid, it may be possible to resolve projected capacity constraints by operating the Water Grid (or part thereof) in a different manner. These changes should be reflected in subsequent versions of the Operating Strategy.
- Operate constrained asset differently – in some circumstances, assets are operated below their design capacity. It may be possible to increase plant output on a permanent basis, or as required, without the need for significant capital expenditure. For example, water treatment plants may be able to be operated for longer periods during peak demand periods.
- Undertake detailed planning investigations – undertake detailed planning assessments to assess timing and options for potential capital works to increase the capacity of the constrained asset or other assets. This may include additional or increased bulk water transport capacity. All options need to be implemented in partnership with the relevant Grid Service Providers and Grid Customers. For options involving capital improvements, there is a clear need for all relevant parties to be involved in a collaborative planning process.

A summary of the relevant facility constraints and recommended course of action in response to the potential constraint identified is provided in **Table 12**. The first three of these response types relate to the demands on, or strategic operation of, the Water Grid. The Water Grid Manager will coordinate these actions. Where these responses are not sufficient, we will make a refined Grid Service Provider service specification for the purposes of detailed planning investigations.

Table 12: Summary actions to address identified constraints

Water treatment plant	Constraint	Monitor water quality issue	Track and revise demand forecasts	Operational response	Operate constrained asset differently	Undertake detailed planning investigation
Mt Crosby Plants	Reliability	x		x		x
Beaudesert	Water quality					x
Kilcoy	Water quality and Demand constraints	x				x
Image Flat/ Maroochy area	Demand constraint			x	x	x
Petrie	Demand constraint					
South Maclean	Water quality	x		x		x
Redlands area	Water quality and potential demand constraints	x	x	x		
Esk	Demand constraint				x	x
Woodford	Demand constraint			x		x
Amity Point	Demand constraint					
Boonah-Kalbar	Water quality	x			x	x
Canungra	Demand constraint and raw water availability		x		x	x
Dayboro	Water quality and raw water availability	x			x	x
Kenilworth	Water quality and Demand constraints	x	x		x	x
Rathdowney	Water quality	x				
Gold Coast area	Potential demand constraint		x	x		

8.5.1 Mt Crosby water treatment plants

Experience and initial assessments show that the Mt Crosby water treatment plants are critical to provision of continuity of supply to the many parts of the Water Grid. If these plants are offline for a prolonged period the ability to continue to supply water is at risk. As such the risk assessment has highlighted the relatively high risk rating for Mt Crosby. This is influenced by both the major consequence of potential constrained supply to large parts of the Water Grid and the likely occurrence of a constraint occurring, based on historical evidence.

We are investigating the level of reliability required from the Mt Crosby water treatment plants, as part of the system-wide investigation. The investigation will consider an alternative means of ensuring system reliability, including alternative supply options. Existing reliability constraints are managed through the operation of the Water Grid. Operational responses will continue to be reviewed and refined.

Seqwater is budgeting for minor capital improvements in 2011–12. It is also investigating options to improve the reliability of supply to meet these specifications.

8.5.2 Beaudesert Water Treatment Plant

The capacity assessment highlighted high water quality risks at the Beaudesert Water Treatment Plant. In addition, the Water Treatment Plant is affected by raw water quality which places additional pressure on the operation of the treatment plant. We consider that these risks are unacceptable for a community which is projected to double from a population of approximately 5,000 in 2006 to over 10,000 in 2016.

The Queensland Water Commission is leading sub-regional planning activities for the medium to long-term infrastructure requirements in the Scenic Rim area. We endorse and support the planning activities currently being led by the Queensland Water Commission.

8.5.3 Kilcoy Water Treatment Plant

Kilcoy has a stand-alone supply taking water from Kilcoy Creek with a backup supply from Somerset Dam. While supply from Somerset Dam is abundant and secure, the existing water treatment plant has limited capacity to meet peak demand or to meet expected demand in the event of a significant demand rebound. The Water Treatment Plant is also subject to water quality and asset reliability constraints.

Tenders have been accepted by Seqwater for a design and construct contract for a 4 ML per day water treatment plant, which will satisfy forecast demands. Delivery of this water treatment plant is expected by December 2012. The prudency and efficiency of this solution is subject to review by the Queensland Competition Authority.

8.5.4 Image Flat and the Maroochy demand zone

The Operating Strategy provides for the Image Flat Water Treatment Plant to meet the demand of the Maroochy Image Flat demand zone only. In addition, the Image Flat Water Treatment Plant can also supply water to the Maroochy Landers Shute zone, if required.

Expected demands with peaking factor applied indicate that this area may experience supply difficulty during extended hot and dry weather periods. Continued water efficiency may delay the occurrence of these constraints, but they are unlikely to be avoided.

Demand on the Image Flat Water Treatment Plant can be reduced by supply from the Landers Shute Water Treatment Plant via the existing bulk water network.

Seqwater have recently engaged engineering consultants CHM2Hill to investigate augmentation options, such as connecting to the Northern Pipeline Interconnector, changing demand zone boundaries, improving the current plant process and upgrading the Image Flat Water Treatment Plant. This investigation is being undertaken in partnership with the Water Grid Manager, LinkWater and Unitywater. Seqwater is investigating options to increase the treatment capacity of this water treatment plant. It is understood that capacity could be increased to 25 ML per day by removing constraints at the Image Flat Water Treatment Plant such as sludge handling.

LinkWater have constructed an off-take flange on the Northern Pipeline Interconnector Stage 2 to enable this zone to be supplemented from the Northern Pipeline Interconnector. Options to construct this connection are being investigated with Unitywater, as part of the Seqwater investigation. The Water Grid Manager requested LinkWater to include an investigation for an interconnection between the Image Flat Water Treatment Plant and the Northern Pipeline Interconnector Stage 2 in 2011–12.

8.5.5 Petrie Water Treatment Plant

The area supplied from the Petrie Water Treatment Plant is currently operated as an isolated network. There is the ability to provide relatively small amounts of water in and out of this area, but this is generally avoided. Among other reasons, this ensures water chlorinated at the Petrie Water Treatment Plant does not mix with chloraminated water from the North Pine Water Treatment Plant.

Under these operating arrangements, the capacity of the Petrie Water Treatment Plant may be insufficient to meet demand in peak months. Given capacity constraints are only approached over the assessment period, close attention will be given to refining demand for this community with the view to refining the level of conservatism associated with the demand forecasts.

There are a range of options available to augment supply to the area supplied by the Petrie Water Treatment Plant, including options that augment the Water Treatment Plant and other options that would involve bulk transport network augmentation. These options are currently being developed, and preliminary assessments undertaken, in collaboration between the Water Grid Manager, Seqwater, LinkWater and Unitywater.

8.5.6 South Maclean Water Treatment Plant

The assessment highlighted reliability and water quality issues at the existing South Maclean Water Treatment Plant.

As explained above a detailed investigation has commenced to assess the options to supply the area south of South Maclean Water Treatment Plant in the short-term, prior to a larger scale decision being made on the sub-regional planning direction for the area, which is being coordinated by the Queensland Water Commission. The outcomes of the investigations may result in operational changes and additional capability constraints.

8.5.7 Redland demand zone

Capacity may be constrained in the Redland area, depending upon the preferred operating mode. This area is connected to the Water Grid through the Eastern Pipeline Interconnector.

The capacity of the Capalaba Water Treatment Plant is constrained to below design capacity due to water quality considerations and maintenance issues. The Operating Strategy reflects this constraint, along with the operation of the Eastern Pipeline Interconnector in a westerly direction at a minimum of 4 ML/d. Remaining demand is supplied from the North Stradbroke Island Water Treatment Plant.

Under these operating arrangements, the capacity of the North Stradbroke Island and Capalaba water treatment plants may be insufficient to meet demand in peak months, as illustrated in **Table 3**. These forecasts include an allowance for a 10% rebound to the existing consumption, to an approximate daily consumption of 52 ML per day.

These capacity constraints are being considered as part of a detailed investigation of water quality issues. This investigation is being undertaken in partnership with Seqwater, LinkWater and Allconnex Water. In the meantime, water will continue to be supplied to this demand zone in the manner outlined above.

Separately, Seqwater has commenced a planning study of options to upgrade the Capalaba Water Treatment Plant. Again, this investigation is being undertaken in partnership with relevant entities.

8.5.8 Esk Water Treatment Plant

The Esk Water Treatment Plant takes water from Wivenhoe Dam. While supply is abundant and secure, the existing Water Treatment Plant has limited capacity to meet peak demand or to meet expected demand in the event of a significant demand rebound. Demand forecasting should be refined in order to confirm the timing of improvements and capacity of improvements.

Seqwater has allocated funding in its 2011–12 budget for an investigation of upgrade options for this water treatment plant. From this location, connection to the remainder of the Water Grid is unlikely to be economically viable.

8.5.9 Woodford Water Treatment Plant

The Woodford Water Treatment Plant can be supplied from either the Stanley River or a Unitywater pipeline that sources water from the Northern Pipeline Interconnector via Elimbah Reservoir.

In practice, Woodford is at times supplied from either the Woodford Water Treatment Plant or Elimbah Reservoir, which is fed from the Northern Pipeline Interconnector. When water quality in the Stanley River is unsuitable, the Woodford Water Treatment Plant is generally shut down with water supplied via a Unitywater pipeline. For the purpose of this assessment, the forecast demand in the Woodford area is only compared against the Woodford Water Treatment Plant capacity to determine the timing and extent to which the Unitywater pipeline would be required.

It is envisaged that this would be sufficient to indicate the extent of the capacity constraint at Woodford Water Treatment Plant and inform detailed planning investigations into the Woodford area.

The Woodford Water Treatment Plant may be unable to meet demand, when solely attempting to meet demand in Woodford. In these circumstances, the pipeline from the Northern Pipeline Interconnector is used to augment supply. In combination, these supplies significantly exceed forecast peak demand. However, Unitywater have identified that further assessment, and potentially augmentation, of the Unitywater pipeline would be needed to ensure it is fit for purpose as a consistent supply measure.

A high water quality risk was identified at the Woodford Water Treatment Plant. This risk, and the risk of asset failure at the Woodford Water Treatment Plant, is also managed through the use of the pipeline.

An investigation into whether pump capacity and reliability is sufficient to ensure supply from the Unitywater pipeline in peak month demands is sufficient to supplement water to this zone will be undertaken as part of a wider options assessment. This may extend the length of time for which the current plant meets the capacity needs of the Woodford zone. This may also involve augmenting the existing pump to improve pumping capacity and altering the way in which water is delivered to customers along the pipeline to ensure the pipeline is suitable to be operated consistently. Water will continue to be taken from the Northern Pipeline Interconnector as required to assist in maintaining a safe and reliable supply.

8.5.10 Amity Point Water Treatment Plant

Amity Point is supplied from a stand-alone water system. Expected demand approaches the available capacity of the Amity Point Water Treatment Plant over the assessment period. The Water Grid Manager will refine demand forecasts for this community with the local Distribution Retail Entity.

We note the design capacity of this water treatment plant is significantly higher than the operational capacity provided by Seqwater. If additional capacity is required, it is suggested the operational capacity of this water treatment plant be assessed as the initial response.

8.5.11 Boonah-Kalbar Water Treatment Plant

Boonah has a stand-alone potable water system taking water from the Warrill Valley Water Supply Scheme including Moogerah Dam via Warrill Creek.

Action 61 of the *South East Queensland Water Strategy* is to investigate water security options for other towns with a stand-alone source of supply, including Boonah. We recommend that this investigation be progressed as a priority.

While allocations exceed expected demand, water security is less than the Level of Service objectives. In the Warrill Valley Water Supply Scheme, more than 8,000 ML per day of high priority water allocation is held by the Water Grid Manager. Previously, 7,000 ML of this allocation was used by Swanbank Power Station, which is now supplied from the Western Corridor Recycled Water Scheme.

Through the System Operating Plan, the Queensland Water Commission has reserved this allocation to enhance the short-term security for urban users in Aratula, Boonah, Kalbar and Mount Alford.

Augmentation options should be investigated for delivery, when required. In the meantime, forecast demand should be reviewed. In particular, it is noted that the demand in this zone reduced significantly and unexpectedly during 2010. It is possible that demand rebound could occur in this community over and above the 10% rebound allowed for in the high demand case.

8.5.12 Canungra Water Treatment Plant

The assessment highlighted that the security of supply for Canungra was less than the Level of Service objectives and that the expected demand forecasts approaches the existing Canungra Water Treatment Plant capacity over the course of the assessment period.

The Queensland Water Commission is leading sub-regional planning activities for the medium to long-term infrastructure requirements in the Scenic Rim area.

8.5.13 Dayboro Water Treatment Plant

The assessment highlighted reliability and water quality issues at the existing Dayboro Water Treatment Plant. Currently, Seqwater stops operating the Water Treatment Plant if raw water quality becomes inadequate for the current treatment technology.

Options for supply to Dayboro are being further considered and developed as part of a wider planning assessment in the Dayboro, Petrie and North Pine area. In the short-term there is the potential for the existing treatment capability to be enhanced. We understand that this may include transferring equipment from the Brisbane Aquifer Project. In the meantime, carting is available as a temporary contingency measure.

Action 61 of the *South East Queensland Water Strategy* is to investigate water security options for other towns with a stand-alone source of supply, including Dayboro. We recommend that this investigation be progressed as a priority.

8.5.14 Kenilworth Water Treatment Plant

Kenilworth is supplied from a stand-alone water system. The expected demand may approach the available capacity of the Kenilworth Water Treatment Plant by over the assessment period.

The design capacity of the Kenilworth Water Treatment Plant is significantly higher than the operational capacity provided by Seqwater. It is suggested the operational capacity of the Kenilworth Water Treatment Plant be assessed as the initial response.

8.5.15 Rathdowney Water Treatment Plant

Water quality risks have been identified at this plant similar to those faced in the Beaudesert Water Treatment Plant, however on a slightly different scale due to the location within the catchment.

8.5.16 Gold Coast area

Under the expected demand with peaking factor applied, the operational capacities of the Molendinar and Mudgeeraba water treatment plants are approached based on the assessed operational philosophy. We will continue to monitor and update the demand projections for this zone and review the operational philosophy of Water Grid assets in this area.

Attachment 4: Interim advice about need for capital expenditure in 2012–13

SEQ Water Grid manager

Secure and efficient water through partnership and innovation

TRIM ref: D/12/165

18 January 2012

Ms Karen Waldman
Chief Executive Officer
Queensland Water Commission
PO Box 15087
CITY EAST QLD 4002

KAREN

Dear Ms ~~Waldman~~

RE: SOUTH EAST QUEENSLAND SYSTEM OPERATING PLAN – INTERIM ARRANGEMENTS

In accordance with Schedule 5, Section 5 (b) of the SEQ System Operating Plan, attached is the SEQ Water Grid Manager's Interim Statement.

This statement covers the issues raised by each of the SEQ Distributor-Retailer Entities, as well as some additional matters that may have a material impact on the need for new or upgraded bulk water supply works to be considered in 2012–13 that the SEQ Water Grid Manager has identified through previous assessments.

If you require any further clarification please contact Grant Horton, A/Director Operations on 3247 4463.

Yours sincerely

[redacted]

Barry Dennien
Chief Executive Officer

Copies:
CEO, Seqwater
CEO, LinkWater
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SEQ System Operating Plan
Planning to Achieve Water Security – Interim Arrangements Schedule 5, Section (5) (b)
SEQ Water Grid Manager Interim Statement

Purpose

This document has been prepared to fulfil the requirements of Schedule 5, Section 5 (b) of the South East Queensland System Operating Plan.

Background

The SEQ Water Grid Manager (WGM) must within 25 business days of receipt of the SEQ Distributor-Retailer entities interim statements, prepare an interim statement that identifies and describes any matters that may have a material impact on the need for new or upgraded bulk water supply works to be considered in the 2012–13 financial year. The interim statement must be consistent with the SEQ Distributor-Retailers' interim statements. The interim statement must be provided to Seqwater, LinkWater, other relevant Grid Participants and the Queensland Water Commission (QWC).

The WGM has taken this requirement to primarily relate to information about matters that would require significant construction or detailed design work to be undertaken in 2012–13. However, the final section of this statement briefly raises a number of other matters that may require some level of consideration in 2012–13, such as preliminary needs assessment.

Interim Statements from the SEQ Distributor-Retailer entities were provided to the WGM over the period 12 December to 16 December 2011. Additional advice sought from Allconnex Water was received on 13 January 2012. On 20 January 2012 QUU verbally provided clarification of the matters raised regarding disinfection improvements which have been captured below. The WGM was advised of QUU's intent to provide this clarification in writing on or about 23 January 2012.

Advice was provided by the Regional Planning and Policy Unit of the QWC that the WGM's interim statement was to be provided by 20 January 2012.

Matters Raised by SEQ Distributor-Retailer Entities

Disinfection Improvement

Matter

The desire to improve disinfection residual in the distribution network was specifically raised by Allconnex Water and Queensland Urban Utilities (QUU) and has been a particular focus of Grid Participants and the WGM during the last twelve months. History has shown that there is a consistent lessening of disinfectant residual throughout the water distribution network in South East Queensland due to a number of contributing factors including lower water demands. QUU requested that the current actions set in place regarding the chloramination process at Mt Crosby and North Pine Water Treatment Plants be maintained.

Allconnex Water is requesting improvements in the level of disinfectant residual supplied at bulk water supply points, as well as on-line monitoring, particularly where water is blended or the source alternates. This matter can be addressed through various mechanisms including changes to operational approaches within the capability of the current infrastructure as detailed below, as well as by potentially new or upgraded bulk water supply works.

Current Actions
Operational improvements in the existing bulk water supply network are being investigated and trialled. These include installing reservoir mixers at Alexandra Hills and Kuraby reservoirs, increasing chlorine dosing at Tugun, Molendinar and Mudgeeraba, running the Eastern Pipeline Interconnector in an easterly direction to improve flows through the Logan area and supplying some of the lower Logan area directly from the Southern Regional Water Pipeline (SRWP).

Operational improvements are also being investigated and trialled in Allconnex Water's area, including more frequent flushing and cleaning of reservoirs, operating reservoirs at lower levels to minimise water age, installation of reservoir mixers and permanent re-chlorination stations, as well as targeted chlorination flushes of key parts of the (chloraminated) reticulation system to remove nitrifying bacteria.

Studies on chloramine stability have also commenced, led by LinkWater and including Seqwater and QUU, to explore further operational changes that will improve chloramine stability from the water treatment plant to the consumers tap. The WGM has also investigated longer term disinfection options, and water quality goals (starting with minimum disinfection residual), for the Grid as a whole. To look at options for long term disinfection strategies across the Water Grid, the WGM has commissioned a study titled SEQ Water Grid Disinfection Options Study. This study has been undertaken in collaboration with Grid Participants.

Additional matters for consideration
Due to the current investigations, actions and operational improvements being undertaken across the Grid to improve disinfection residuals, the WGM considers that the following items are additional matters that may impact the need for new or upgraded bulk water supply works to be considered in 2012–13:

- the Water Grid Disinfection Options Study to be completed in early 2012
- the review of outcomes of the various operational improvements mentioned under the "Current Actions" heading above.

In summary, due to various contributing factors including lower demands, maintaining disinfectant residuals has become more difficult, and operational changes are being trialled and implemented to improve the process. The WGM considers that these operational changes need to be fully explored and outcomes assessed as part of consideration of the need for new or upgraded bulk water supply works in 2012-13.

South Maclean/South Logan/Beaudesert/Canungra Area

Matter
Allconnex Water raised the significant work that it has undertaken as part of its overall distribution improvements as a matter that may have a material impact on the need for new or upgraded bulk water supply works. One specific item raised was the potential need to upgrade a pump at South Maclean. QUU raised the need to continue the planning process.

In various asset planning forums, Beaudesert and Canungra have been identified as possible high growth areas, with State and local government highlighting this area as well.
This growth could in turn lead to an increase in potential water demand of 15-25% per annum. This will require water supply augmentation when the development occurs.

Current Actions
This area is under investigation via a QWC planning process to determine the best overall solution.

Additional matters for consideration
Current trends in growth and water demand in these areas (particularly Canungra) is an additional matter that may have a material impact on the need for new or upgraded bulk water supply works to be considered in 2012–13. With current demands, the WGM does not see any need for significant capital expenditure to make additional capacity available in 2012–13. However, the WGM has also identified Canungra as having potential capability issues within the next five years if demand grows as projected. Demand forecasts are wide and varied, and actual growth during the last three years is much lower than the level of growth as originally forecasted, raising queries about appropriate assumptions for water demand and growth forecasts.

The WGM considers that timing of additional bulk water supply works based on actual demand triggers would enable work to be staged to minimise early investment and/or over capitalisation, and would seem a reasonable matter to be considered in the development of an asset plan. A staged approach which deferred major capital expenditure for as long as possible would seem to be prudent in this area to enable actual growth rates to be more accurately assessed.

New Connections to Southern Regional Water Pipeline

Matter
Allconnex Water has raised the need for two new connections in the Flagstone and Beenleigh areas due to predicted growth in the area.

Current Actions
Preliminary discussions between Allconnex Water and LinkWater have commenced.

Additional matters for consideration
In both cases, a planning report is required which clearly shows that each connection provides the best solution for the grid overall, and that the timing is based on robust

demand predictions and current demands to minimise premature investment. From the information provided thus far, it is unclear whether this matter requires detailed design, construction or preliminary consideration in 2012–13.

Molendinar Area – Upgrades

Matter
Operational issues have been identified in relation to excessive pressures and fluoridation at the M04 Pump Station at the Molendinar Water Treatment Plant complex which may impact on the need for new or upgraded bulk water supply works to be considered in 2012-13.

Current actions
Preliminary discussions between Allconnex Water and LinkWater have commenced.

Additional matters for consideration
The WGM supports improvements necessary to address matters such as these, and relies on the Grid Service Providers to negotiate and determine the best solution.

Redlands Area

Matter
Allconnex Water hase identified that the eastern link currently owned by Allconnex Water is an essential component of the longer term planning for the Redlands area, and should be purchased by LinkWater. This is not so much a matter that may impact on the need for new or upgraded bulk water supply works, but may influence the transfer of an existing group of assets. The WGM has also identified this area as having potential capability issues within the next five years.

Current Actions
Early discussions have commenced regarding maintenance requirements for Capalaba Water Treatment Plant and sizing requirements. These discussions have been initiated by Seqwater, and have involved representatives from LinkWater, WGM, Allconnex Water and Seqwater.

Additional matters for consideration
A sub-regional supply strategy is required in this area. The following items are matters that may be considered in such a strategy, and that may impact the need for new or upgraded bulk water supply works to be considered in 2012–13:

- Water quality issues in relation to the Capalaba Water Treatment Plant are being managed in part through the SEQ Water Grid Annual Operations Plan and monthly Grid Instructions by blending with alternative supplies, and reservoir management being undertaken by LinkWater and Allconnex Water.
- Based on current demands, the WGM does not see any need for significant capital expenditure to make available additional capacity in 2012–13, unless specifically required due to maintenance issues.

Mt Cotton Road – New Connection

Matter
Allconnex Water has identified a need for a new bulk water supply point at the intersection of Boundary Road and Taylor Road, Thornlands due to intensification of development planned in this area.

Current actions
Preliminary discussions between Allconnex Water and LinkWater have commenced.

Additional matters for consideration
The development of a planning report showing that this connection will provide the best solution for the grid overall and that timing is based on robust demand predictions and current demands to minimise premature investment would appear reasonable before action is taken. From the information provided by Allconnex Water thus far, it is unclear whether this matter requires detailed design, construction or preliminary consideration in 2012–13.

Image Flat – new connection to the Northern Pipeline Interconnector Stage 2

Matter
Unitywater has identified a need for a new connection at Image Flat via the Northern Pipeline Interconnector (NPI) Stage 2 to improve the reliability and resilience of supply to the area supplied by Image Flat Water Treatment Plant. Currently, this area is dependent on the one source of water via Image Flat Water Treatment Plant, with limited interconnection through the reticulation system to Landers Shute Water Treatment Plant.

Current actions
LinkWater and Unitywater have formally applied for the new bulk water supply point.

Additional matters for consideration
The WGM has also identified an immediate capability requirement in this area via the annual market review process and has provided support for this 500mm interconnection to be installed in 2012–13. The application for a new Bulk Supply Point has been made, and the WGM is currently considering approval of this new Point.

This interconnection will improve reliability of supply in this area and will also reduce the supply requirements of the Image Flat Water Treatment Plant potentially deferring the need for significant capital cost upgrades for 5-10 years by providing a base supply from the NPI.

Matters identified by the WGM

The Annual Market Rules Review 2010–11 section 8.5 also identified a summary of issues to be investigated. Of the items raised in the Annual Market Rules Review Report, the following matters have not been identified by the SEQ Distributor-Retailer retailer entities and may have a material impact on the need for new or upgraded bulk water supply works to be considered in 2012-13. In addition, through discussions with Grid Participants, a range of other matters have been raised that have informed in part the matters listed below.

Mt Crosby water treatment plants

Matter
These plants are critical to provision of continuity of supply to many parts of the Grid. Experience has shown that there are occasions where, due to water quality issues, the output of the plant needs to be reduced to ensure the continued supply of water at required standards, largely targets for some aesthetic parameters. Fluctuation in raw water quality and the capability of Mt Crosby to deal with some issues may have a material impact on the need for new or upgraded bulk water supply works to be considered at Mt Crosby Water Treatment Plants in 2012–13.

In addition, the following matters may have an impact on the need for new or upgraded bulk water supply works to be considered in 2012-13:

- The full capability of 916 ML/day from the Mt Crosby Water Treatment Plants will not be required for many years.
- The connectivity of the Water Grid provides the flexibility to minimise the effect of certain aesthetic issues through blending; however, there is a minimum requirement for Mt Crosby Water Treatment Plant that needs to be provided at all times.
- This minimum requirement will grow over time as demands in the greater Brisbane area grow.
- The current average production figure from this plant is 260ML/day, of which 150-200 ML/day is required as a reliable minimum.

Current Actions
The WGM was briefed some time ago at the preliminary stages of identification of potential issues to be addressed through future planning activities.

South Maclean Water Treatment Plant

Matter
Reliability and water quality issues have been identified at this plant, which consequently operates on a minimal basis.

The future of this plant including options such as decommissioning, should be considered during 2012–13 as part of the wider planning forum being led by QWC.
The outcome of this consideration may be a matter that has a material impact on the need for new or upgraded bulk water supply works to be considered in 2012–13, depending on the ultimate design chosen for the bulk and distribution network in this South Logan area.

Current actions
As per the matter raised earlier in this document under the title South Maclean/South Logan/Beaudesert/Canungra Area.

Esk Water Treatment Plant

Matter
Capability assessments have indicated the potential for this water treatment plant to have capacity issues during peak periods which have not manifested recently due to the milder weather conditions.

A more detailed investigation is required for supply of water to Esk, and whether the likely demand is sufficient to impact the need for new or upgraded bulk water supply works to be considered in 2012–13.

Current action
Annual Market Rules Review Report flags this area as one for further consideration.

Areas potentially requiring investigations in 2012–13

In addition, there is the need to investigate the need for additional capability in other areas such as Petrie (including a potential connection to the NPI), Woodford, Amity Point, Boonah-Kalbar, Dayboro, Kenilworth, Rathdowney and Gold Coast area. Due to lead times for capital works it may be necessary to consider these areas and matters such as growth, water quality and capability in 2012–13. This may involve further preliminary investigations into the need for new or upgraded bulk water supply works past 2012–13.

Based on the information currently available to the WGM, the WGM is not aware of any other significant matters that may have a material impact on the need for new or upgraded bulk water supply works to be considered in the 2012–13 financial year.

28 February 2012

Ms Karen Waldman
Chief Executive Officer
Queensland Water Commission
PO Box 15087
CITY EAST QLD 4002

Dear Ms Waldman,

SOUTH EAST QUEENSLAND SYSTEM OPERATING PLAN
– INTERIM STATEMENT

In accordance with Schedule 5, Section 5(c) of the SEQ System Operating Plan (SOP), attached is Seqwater's Interim Statement.

As prescribed, this statement addresses the matters raised in the SEQ Water Grid Manager's interim statement.

If you have any queries on these matters, please contact David Doyle, Manager, Integrated Asset Planning on 3035 3827.

Yours sincerely,

[redacted]

Peter Borrows
Chief Executive Officer

Attach.

Copies to: *CEO, SEQ Water Grid Manager*
CEO, LinkWater
CEO, Allconnex
CEO, Unitywater
CEO, Queensland Urban Utilities

SEQ System Operating Plan, (SOP) Schedule 5, Section 5(c).
Seqwater Interim Statement

Seqwater manages a complex asset portfolio, comprising a range of natural and built assets of varying asset types, ages, sizes, geographic dispersion and condition, accompanied by varying degrees of asset information and knowledge. Seqwater recognises that its effectiveness as a business is underpinned by its understanding and management of its assets.

To provide consistency in the management of these Assets, Seqwater has developed an Asset Management Framework which encompasses the entire lifecycle of physical assets, from direction setting, to management in use, to disposal, as well as considering the broader direction and long term planning of its asset portfolio.

Under its Asset Management Framework, Seqwater is continuing development of its Asset Portfolio Master Plan (APMP). The APMP takes a 30 year view with regard to our catchment based assets and provides the criteria used to determine asset investment prioritisation. The APMP includes among many other elements, the outcomes of regional, sub-regional and individual asset planning. The master planning process is a consultative process, engaging internal and external stakeholders to, understand our business drivers, verify the optimum Grid and business response, and identify options for major changes to the attributes of Seqwater's catchment assets which may be required over time. The APMP will form the basis of its Water Supply Asset Plan (WSAP) required under the most recent SOP amendments.

Actions required under the master plan are validated as and when they fall due via the completion of Options Studies and preparation of subsequent Business Cases for approval of projects, through our regulatory and business governance processes.

Matters Raised by SEQ Water Grid Manager (WGM)

Matter - Disinfection Improvement
History shows that due to a number of contributing factors including lower demands, maintaining disinfectant residuals throughout the SEQ water distribution network has become more difficult. Operational changes are being trialed and implemented to improve the process. The WGM considers that these operational changes and trials need to be fully explored and outcomes assessed as part of consideration of the need for new or upgraded bulk water supply works in 2012-13.

Response
Seqwater currently supplies Bulk Water according to the conditions of the Grid Contract. The expenditure of capital to achieve higher levels of disinfection residuals, without a regulatory driver, would likely raise the issue of prudency with the regulator (QCA).

When considering this issue, thought must also be given to the impacts regulatory and operational changes may have on the operational expenditure and capital expenditure of the Grid Partners involved. Specifically the effective transfer of costs from one entity to another. Government policy decisions will be required on this issue, which cannot be made by the WGM. All parties impacted will need to provide input to the information being supplied to government to support the making of such policy decisions.

Seqwater will continue to support and contribute to the various operational change trials and studies currently underway, as detailed in the WGM's Interim Statement, so as to continue to assist our Grid Partners. The outcomes of these trials and studies will inform the information to be provided to support the making of the policy decisions referenced above.

Also noted is the WGM's reference to the Water Grid Disinfection Options Study to be completed in early 2012. Seqwater looks forward to continuing its involvement in this study.

Matter – South Maclean, South Logan, Beaudesert, Canungra Area
In various planning forums, Beaudesert and Canungra have been identified as possible high growth areas, with State and Local government highlighting this area as well. This growth could in turn lead to an increase in potential water demand of 15-25% per annum. This will require water supply augmentation when the development occurs. This area is under investigation via a QWC planning process to determine the best overall solution. Allconnex raised in their statement, the possible need to upgrade a pump at South Maclean.

With current demands the WGM does not see any need for significant capital expenditure to make additional capacity available in 2012-13. However the WGM has identified Canungra as having potential capability issues with the next five years if demand grows as projected. Actual growth during the last three years is much lower than the level originally forecast, raising queries about the appropriate assumptions for water demand and growth forecasts.

The WGM considers that timing of additional bulk water supply works based on actual demand triggers would enable work to be staged and would seem a reasonable matter to be considered in the development of an asset plan. A staged approach which deferred major capital expenditure for as long as possible would seem to be prudent in this area to enable actual growth rates to be more accurately assessed.

Response
As a participant in the current Scenic Rim collaborative planning trial facilitated by the QWC and acknowledged by the WGM in their Interim Statement, Seqwater will await the outcome of this planning process before then making appropriate determinations regarding our assets in this area. It may be an outcome of this study that no need for additional capacity in the 2012-13 year is identified. Seqwater may however determine that expenditure is required due to issues associated with asset condition or the meeting of peak demand capacities as differentiated from average demands. Any such expenditure would then be reflected in Seqwater's future budgets and WSAP.

The WGMs comments regarding the use of actual demand triggers in the development of an asset plan and the need to defer major capital expenditure where possible are acknowledged. It must be noted however that under Section 6 of the System Operating Plan, Desired Level of Service (LOS) objectives are specified. Seqwater's asset planning must take into account the desired LOS objectives. Seqwater's asset planning will also reflect outcomes of the WSAP process under the SOP. This planning will account for the Distribution Retailers Water Demand Forecasts.
As a matter of course in formulating and implementing any asset plan, Seqwater will always follow its Asset Management Framework and own internal investment approvals processes, including assessment of prudency of expenditure decision and efficiency of proposed delivery model, prior to the commencement of any project.

Seqwater is seeking clarification of the issue raised by Allconnex regarding the possibility of a pump upgrade at South Maclean. This matter was not expressly raised in Allconnex's Interim Statement.

Matter – New Connections to the Southern Regional Water Pipeline
Allconnex Water has raised the need for two new connections in the Flagstone and Beenleigh areas due to predicted growth in the area. Preliminary discussions have commenced between Allconnex Water and LinkWater. Planning reports are required.

Response
Seqwater will anticipate being involved in the planning process so as to ensure demands can be met. It is expected that the 20 year Water Demand Forecasts supplied as part of the SOP WSAP process will also reflect these.

Matter – Molendinar Area Upgrades
Operational issues have been identified in relation to excessive pressure and fluoridation at the MO4 Pump Station at the Molendinar Water Treatment Plant complex which may require works in 2012-13. Preliminary discussions have commenced between Allconnex Water and LinkWater.

Response
Seqwater has an approved business case (February 2011) for pipe cross-connection work to alleviate this problem. LinkWater and Allconnex were involved in the development of the preferred option for this business case. The WGM has previously been advised of the need for a short term reduction in capacity of this plant, in relation to this issue. These works will be conducted during 2012 and expenditure is already reflected in Seqwater's budget.

Matter – Redlands Area
Allconnex Water has identified that the Eastern Link currently owned by them is an essential component of the longer term planning for the Redlands Area and should be purchased by LinkWater.

The WGM has also identified this area as having potential capability issues within the next five years and states that early discussions have been initiated by Seqwater regarding Capalaba Water Treatment Plant (WTP) maintenance requirements and sizing requirements. A sub-regional supply strategy is required in this area and should consider:

- Water quality issues currently being partly managed through the Annual Operations Plan and monthly Grid Operating Instructions, and reservoir management being undertaken by LinkWater and Allconnex Water.
- The WGM does not see any need for significant capital expenditure to make available additional capacity in 2012-13, unless specifically required due to maintenance issues.

Response
Seqwater has completed a needs analysis and options study into the Capalaba WTP and is currently finalising a business case to undertake major capital expenditure which will commence in the 2012-13 year, subject to formal approval. Seqwater has consulted with Grid Partners during this process. This project will address the key drivers of maintenance renewals and water quality compliance for Tri-Halo Methane's (THM's). Expenditure will be staged over a three year period with $3M budgeted for the 2012-13 year.

Comment regarding Eastern Link is noted, however, it is also noted that any such infrastructure transfer is a government policy decision and as such cannot be made by the WGM.

Matter – Mt Cotton Road – New Connection
Allconnex Water has identified a need for a new bulk water supply at the intersection of Boundary Road and Taylor Road, Thornlands due to development in the area. Preliminary discussions between Allconnex Water and LinkWater have commenced. A planning report should be developed.

Response
Seqwater will anticipate being involved in the planning process so as to ensure demands can be met. It is expected that the 20 year Water Demand Forecasts supplied as part of the SOP WSAP process will also reflect these.

Matter – Image Flat – New Connection to the Northern Pipeline Interconnector (NPI) Stage 2
Unitywater has identified a need for a new connection at Image Flat via the NPI Stage 2 to improve the reliability and resilience of supply to the area supplied by the Image Flat WTP. LinkWater and Unitywater have formally applied for the new bulk supply point. The WGM has provided support for this interconnection to be installed in 2012-13. This interconnection will reduce the supply requirements of the Image Flat WTP potentially deferring the need for significant capital cost upgrades for 5-10 years.

Response
Seqwater notes this possible new connection and the impact it may have on the Image Flat WTP and supply in this area. Seqwater may however determine at a future time that expenditure is required on the Image Flat WTP due to issues associated with asset condition and raw water quality.

QWC and the WGM should also note that Seqwater's high level sub-regional planning for this area has identified that future capacity upgrades to this WTP may be used to supply water to the SEQ Water Grid, via the NPI Stage 2. Such augmentation and connection would allow access to the currently under utilised water allocation in this area and hence have the beneficial impact of delaying any future additional water source for the Water Grid. Any connection being proposed, should consider the possibility of a future bi-directional flow capability. Collaborative ongoing development of this option will be undertaken through Seqwater's development of its WSAP required under the SOP.

Matter – Mount Crosby Water Treatment Plants

There have been occasions where, due to raw water quality issues, the output of the plant needs to be reduced to ensure the continued supply of water at required standards, largely targets for some aesthetic parameters.

- The full capability of 916 ML/day will not be required for many years.
- The connectivity of the Water Grid provides the flexibility to minimise the effect of certain aesthetic issues through blending however there is a minimum requirement for Mt Crosby WTP that needs to be provided at all times.
- The minimum requirement will grow over time as demands in the greater Brisbane area grow.
- The current average production figure from this plant is 260ML/day of which 150-200ML/day is required as a reliable minimum.

The WGM has received a preliminary briefing regarding identification of potential issues to be addressed through future planning activities.

Response

Whilst some works are currently being undertaken at both Mt Crosby East Bank and Mt Crosby West Bank WTPs, Seqwater continues to progress long term planning to determine their optimal future use. This planning is expected to be well progressed during the 2012-13 year and will take into account, among other issues, raw water quality, optimal treatment processes, average and peak demands, grid resilience and the condition of the Mt Crosby Weir. Due to the age and condition of some plant and equipment at these sites, Seqwater intends to undertake a full capability assessment against current water quality requirements to determine actual capacity of the sites. This will further inform planning requirements.

QWC and the WGM should also be aware of two additional considerations that Seqwater must account for in its planning.

1. Seqwater views water treatment as occurring across all of the source, store and supply phases of the water cycle. Consistent with this approach, Seqwater is constantly reviewing raw water quality and those things which impact upon it in catchments and storages. In line with this strategy, Seqwater will continue to engage with the community to influence land uses within our catchment areas and will also seek to invest in our catchments as appropriate to improve raw water quality. Outcomes of this approach will, over time, improve the raw water quality for the Mt Crosby WTPs, and defer or potentially offset capital investment in additional treatment processes.

2. Whilst the current capacity of the Mt Crosby WTPs is in excess of average daily demands, Seqwater Asset Portfolio Planning also takes into account SOP LOS Objectives and grid resilience. Grid resilience planning includes but is not limited to the ability of the Grid to continue to operate during and after major events and plant shutdowns, planned and unplanned, through alternate water sources and appropriate levels of redundancy commensurate with risk.

Matter – South Maclean Water Treatment Plant
Reliability and water quality issues have been identified at this plant, which consequently operates on a minimal basis. The future of this plant including options such as decommissioning, should be considered during 2012-13 as part of the wider planning forum being led by QWC.

Response
As a participant in the current Scenic Rim collaborative planning trial, facilitated by the QWC, Seqwater will await the outcome of this planning process before then making appropriate determinations regarding our assets in this area. The preliminary draft report of this study concluded that the future of the South Maclean WTP should be determined separately to this planning trial. Seqwater have subsequently requested that the future of South Maclean WTP be re-included in this study as it requires collaboration across the same key stakeholders, with decisions over its future being dependent on the outcomes from the sub-regional planning underway.

While raw water quality for this WTP can at times be poor, the asset itself is generally in good condition. Instances of plant shutdown due to raw water quality are rare. Any consideration of the potential decommissioning of this plant must also consider the need of Allconnex to continue to utilise plant including pumps and pipes on this site to maintain supply to the local area.

QWC and the WGM should also note that any decision to decommission this WTP would have the implication of the existing water allocation utilised for this site being effectively lost until such time as future infrastructure could again provide access to it.

Matter – Esk Water Treatment Plant
Capability assessments have indicated the potential for this water treatment plant to have capacity issues during peak periods which have not manifested recently due to the milder weather conditions. A more detailed investigation is required for supply of water to Esk, and whether the likely demand is sufficient to impact the need for new or upgraded bulk water supply works to be considered in 2012-13. Annual Market Rules Review Report flags this area as one for further consideration.

Response
Seqwater has provided budget to undertake a planning study for the Esk WTP during the 2012-13 year. The outcomes of this study will be included in its Asset Portfolio Masterplan and WSAP, as required under the SOP. In respect of the WGM's referenced current action, it is also noted that Seqwater received a copy of the WGM's Annual Market Rules Review 2010-11 Report by letter dated 22 February 2012 (ie; after the issue of the WGM's interim statement). Whilst Seqwater has corresponded with QWC regarding capacity constraints identified in table 11 of that report:–

- Seqwater has not yet had sufficient opportunity to consider the entire report in any detail; and
- there was limited consultation with Seqwater prior to lodgement of the report with QWC.

Matter – Areas Potentially Requiring Investigations in 2012-13
There is a need to investigate the need for additional capability in other areas such as Petrie, Woodford, Amity Point, Boonah-Kalbar, Dayboro, Kenilworth, Rathdowney and the Gold Coast area.

Response
Consistent with, and as part of the ongoing development of, its Asset Portfolio Master Plan, Seqwater has recently undertaken the following:

- Preparation of a Business Case for the Kalbar WTP to undertake major capital expenditure which will commence, subject to formal approval, in the 2012-2013 year. Seqwater has consulted with Grid Participants during this process. This project will address the key drivers of water quality and supply reliability and, peak capacity demands. Expenditure will be staged over a three year period. Total costs are estimated to be $5.3M with $2.5M to be spent during the 2012-13 year.
- A sub-regional planning report for the Caboolture, Woodford, Banksia Beach and Woorim WTP's has recently been completed. Grid participants have been consulted during the production of this planning report.
- A sub-regional planning report for the North Pine, Petrie and Dayboro WTPs has recently been completed. Grid participants have been consulted during the production of this planning report.
- Provided budget to undertake planning studies for the Amity Point, Kenilworth and Rathdowney WTPs during the 2012-13 year.
- Commenced detailed options studies into the Molendinar and Mudgeeraba WTPs. Grid participants are being consulted throughout this process.

The outcomes from this work will also inform development of the WSAP, as required under the SOP.

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Our Ref:PS:LAB:531808

2 March 2012

Ms Karen Waldman
Chief Executive Officer
Queensland Water Commission
P O Box 15087
CITY EAST QLD 4002

Dear Ms Waldman

LinkWater's Interim Statement under Chapter 5 of the South East Queensland System Operating Plan

As you are aware on 11 November 2011 the South East Queensland System Operating Plan (SOP) was revised, with one revision being a process for planning to achieve water security for South East Queensland.

Under Chapter 5 LinkWater must, within 30 business days of receipt of the South East Queensland Water Grid Manager's (SEQ WGMs) Interim Statement, prepare an Interim Statement that addresses the matters raised. This must be provided to the Queensland Water Commission (QWC), Seqwater, the Distribution Retailers and the SEQ WGM. The SEQ WGMs Interim Statement was received by LinkWater on 20 January 2012.

For LinkWater to meet its obligations under Schedule 5 and to assist with improved infrastructure planning outcomes, LinkWater has implemented the following initiatives:

- Developing a Network Planning Partnership with the Distribution Retailers
- Established a consultation forum with Seqwater and proposing a similar one with the SEQ WGM
- Improved operations, water quality, network planning and cost optimisation models
- A comprehensive Geographic Information System.

The activities referred to within the LinkWater Interim Statement have, where appropriate, been developed in consultation with the QWC, Seqwater, the Distribution Retailers and the SEQ WGM.

LinkWater and the Distribution Retailers have identified the importance of supporting the collaborative planning arrangements identified in the SOP and have been engaged in developing a Network Planning Partnership. At the request of Seqwater a separate forum has been established between Seqwater and LinkWater. LinkWater has approached the SEQ WGM seeking an informal approach to collaborative planning.

Should the QWC have any questions about the LinkWater Interim Statement please contact Peter Sommer, Manager Infrastructure Planning on (07) 3270 4060 or via email to peter.sommer@linkwater.com.au

[redacted]

Yours faithfully

[redacted]

Peter McManamon
Chief Executive Officer

[redacted]

SEQ Water Grid Manager - Mr Barry Dennien
Allconnex - Andrew Foley
Queensland Urban Utilities - Ian Maynard
Unitywater - Jon Black
Seqwater - Peter Borrows

LinkWater

The Queensland Bulk Water Transport Authority

Interim Statement Under Schedule 5 of the South East Queensland System Operating Plan

February 2012

Distribution list

Name	Title

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LinkWater

Document Control

Version number	Reviewer			Approved for issue			
	Date	Name	Signature	Date	Name	Position	Signature
1	2/3/2012	Peter Sommer Andrew Moir	[redacted]	2/3/2012	Peter McManamon	Chief Executive Officer	[redacted]

Contents

Executive Summary

Under Chapter 5 of the South East Queensland System Operating Plan LinkWater must address the matters raised in the South East Queensland Water Grid Manager's (SEQ WGM) Interim Statement (provided in **Appendix 1**).

Planning tools

For LinkWater to meet its obligations under Chapter 5 and to assist with improved infrastructure planning outcomes, LinkWater has implemented the following initiatives:

- Developing a Network Planning Partnership with the Distribution Retailers
- Established a forum with Seqwater and proposing a similar one with the SEQ WGM
- Improved operations, water quality, network planning and cost optimisation models
- A comprehensive Geographic Information System.

Network Planning Partnership

LinkWater and the Distribution Retailers have identified the importance of supporting the collaborative planning arrangements identified in the System Operating Plan and have been developing a Network Planning Partnership. A separate forum has been established between Seqwater and LinkWater. A similar forum is being established with the SEQ WGM.

Modelling tools

LinkWater maintains a number of core network analysis tools to assist in infrastructure planning and to identify operational improvements. These models are capable of undertaking detailed simulations of hydraulics and network water quality.

Geographic Information System

With over 550 kilometres of pipelines and facilities (pump stations, reservoirs), LinkWater maintains a Geographic Information System to assist with operation and planning. This includes key spatial information sets from other utilities, land owners and interacting data.

Infrastructure planning

LinkWater has been either taking the lead or participating in infrastructure planning in the following activities:

- Scenic Rim collaborative planning
- Assessing new connections to the Southern Regional Water Pipeline (SRWP)
- Planning the Image Flat supply zone connection to the Northern Pipeline Interconnector
- Identifying potential desalination pipeline corridors

- Pre-construction activities for the Cedar Grove and Karawatha inter-connector project.

Scenic Rim collaborative planning

LinkWater has been assisting in a Queensland Water Commission (QWC) collaborative planning project to ensure reliable water supply to the stand-alone communities in the Scenic Rim. Other participants are Allconnex Water (Allconnex), Queensland Urban Utilities, Seqwater and SEQ WGM. Costing for the pipeline and stand alone supply options for Beaudesert and Canungra have been produced by LinkWater/Allconnex (pipeline) and Seqwater (water treatment plant (WTP)).

New connections to the Southern Regional Water Pipeline

The SEQ WGM Interim Statement refers to 'the need for two new connections in the Flagstone and Beenleigh areas due to predicted growth in the area'. The Flagstone connection involves the commissioning of the existing Beaudesert (New Beith) off-take from the SRWP. This off-take was constructed in conjunction with the SRWP and has been awaiting the construction of the downstream infrastructure.

Preliminary, high level discussions have been held between LinkWater and Allconnex about the new Beenleigh off-take.

Image Flat supply zone connection to the Northern Pipeline Interconnector

During planning of the Northern Pipeline Interconnector Stage 2, discussions were held with Unitywater about future off-take locations. A site at the Nambour Showgrounds was selected and a blank tee installed. A letter of endorsement from the SEQ WGM for LinkWater to connect the tee to the distribution network was received on 1 February 2012.

Potential desalination pipeline corridors

The QWC requested LinkWater to investigate and report on the potential pipeline corridor connections from the proposed Marcoola, Lytton and Bribie Island desalination plants sites to the South East Queensland Water Grid. In February 2012 a report was provided to the QWC.

Cedar Grove and Karawatha inter-connector project

LinkWater was directed under the *State Development and Public Works Organisation Act 1971* to undertake planning and investigation activities for a pipeline between the proposed Wyaralong WTP to the SRWP and then to the Kuraby Reservoir. This is described in the legislation as the Cedar Grove and Karawatha inter-connector project. This project involves the construction of approximately 32 kilometres of large diameter (nominally 1085mm) underground pipeline.

The Environmental Impact Statement and preliminary design are scheduled to be complete by late 2012. Activities following this timeframe will include regulatory approvals, and pending approval of additional funding for the acquisition of land.

Activities in the Interim Statement have, where appropriate, been developed in consultation with the QWC, SeqWater, Distribution Retailers and the SEQ WGM.

1. Background

On 11 November 2011 the South East Queensland System Operating Plan Revision 4.0 (SOP) was released. A copy of the SOP is available from the Queensland Water Commission (QWC) website http://www.qwc.qld.gov.au/security/operatingplan.html.

The main revisions of the SOP include:

- a framework for preparation of a Manufactured Water Readiness Plan for each manufactured water facility
- a process for planning to achieve water security for South East Queensland (SEQ)
- principles consistent with the *Water Act 2000* to which all entities must have regard
- requirement for an Operating Strategy re-named to an Annual Operations Plan
- other minor amendments throughout the SOP to maintain consistency.

Chapter 12 Planning to achieve water security lists a process in Schedule 5 that covers:

- activities that will assist the QWC to perform its functions of ensuring water security in SEQ in accordance with the Levels of Service (LoS) objectives
- a process to facilitate planning to support the water security function of the QWC.

The planning process in Schedule 5 involves:

- Interim arrangements - Chapter 5 of Schedule 5
- Long term 20 year planning Chapters 1 to 4 of Schedule 5.

Under Chapter 5 Seqwater and LinkWater must each, within 30 business days of receipt of the South East Queensland Water Grid Manager's (SEQ WGM) Interim Statement, prepare an Interim Statement that addresses the matters raised. The Interim Statement must be provided to the QWC, Seqwater, the Distribution Retailers and the SEQ WGM. The SEQ WGM's Interim Statement (provided in **Appendix 1**) was received by LinkWater on 20 January 2012. The SEQ WGM's Interim Statement is in response to Interim Statements received from the Distribution Retailers (also provided in **Appendix 1**).

This LinkWater Interim Statement meets the interim arrangements of Schedule 5.

For LinkWater to meet its obligations under Schedule 5 and to assist with improved infrastructure planning outcomes, LinkWater has implemented the following initiatives:

- Developing a Network Planning Partnership (NPP) with the Distribution Retailers
- Established a planning forum with Seqwater and proposing a similar one with the SEQ WGM
- Improved operations, water quality, network planning and cost optimisation models
- A comprehensive Geographic Information System (GIS).

2. Collaborative planning

2.1. Network Planning Partnership with Distribution Retailers

The QWC established a Modelling Technical Working Group (TWG) in 2010 with representatives from the SEQ WGM, Seqwater, LinkWater and the Distribution Retailers. The task of facilitating this work was allocated to LinkWater at the Chief Executive Officer's workshop late in the year.

LinkWater and the Distribution Retailer members of the Modelling TWG identified the importance of supporting the collaborative planning arrangements identified in the SOP and have been engaged in developing the NPP with a governance structure and collaborative planning role. The Modelling TWG has evolved into the NPP.

The proposed governance arrangements of the NPP are a Steering Committee made up of senior executives and a TWG comprising experts from the Distribution Retailers and LinkWater.

The TWG is collaboratively developing/compiling Standards of Service and Service Specifications. Standards of Service relate to water characteristics at the customer tap while Service Specifications are water characteristics at bulk water supply points. The Standards of Service and Service Specifications would be approved by the appropriate authority which is likely to be the QWC and the SEQ WGM. The TWGs would ensure that asset planning is aligned with the Standards of Service and Service Specifications and directions given by the steering committee.

The NPP will assist LinkWater with developing the Water Supply Asset Plan (WSAP) and making relevant Queensland Competition Authority submissions.

2.2. Consultation with Seqwater and the South East Queensland Water Grid Manager

LinkWater and Seqwater have established an informal approach to collaborative planning. Technical officers will consult with the aim of improving each entities infrastructure and the drivers for infrastructure planning. The knowledge that will be shared by both entities will develop a greater understanding of how the South East Queensland Water Grid (SEQ Water Grid) works and of localised demand issues including supply and network constraints.

Seqwater and LinkWater will engage with the SEQ WGM and the Distribution Retailers as needed on characteristics that will influence the development of the WSAPs. These characteristics being demand assumptions, Service Specifications and LoS.

This consultation will assist with ensuring consistency between the LinkWater and Seqwater WSAPs and also to ensure that the best 'Whole of SEQ Water Grid' outcomes are achieved.

LinkWater has also approached the SEQ WGM seeking an informal approach to collaborative planning.

3. LinkWater operational and planning models

LinkWater maintains a number of core network analysis tools to assist in infrastructure planning and to identify operational improvements. These operational and planning models are developed as 'fit-for-purpose' tools and range from dynamic models capable of undertaking detailed, extended period simulations of system hydraulics and network water quality to relatively simple bulk water balance spreadsheets.

LinkWater has developed operational and planning optimisation models that are able to determine the lowest overall variable cost for the SEQ Water Grid using a bulk water balance approach. This will be adopted extensively in developing the LinkWater WSAP to ensure that operating strategies and infrastructure investment is consistent with the SOP principles for water supply operations. This also aligns with LinkWater's Asset Management Plan.

To achieve the SOP intention of 'planning to achieve water supply security', LinkWater has requested a copy of the QWC SEQ regional water balance model (WATHNET). The model is required so that when developing the WSAP, LinkWater is able to establish the yield implications of bulk water transport capacity and assist the QWC in meeting its regional water security obligations.

4. LinkWater Geographic Information System

With over 550 kilometres (km) of pipelines, valves, pump stations and reservoirs LinkWater maintains a comprehensive GIS to assist with operation and planning. This includes all LinkWater assets (physical bulk water network and land) plus key spatial information from other utilities, land owners and interacting data (roads, electricity services, contours, waterways).

LinkWater operates a full licence for the ESRI platforms with an ArcGIS Server and a Dekho Enterprise solution as the LinkWater standard GIS, which includes for seven 'power-users' and over one hundred internal web-based viewing clients.

To improve the accurate location and up to date knowledge of inherited assets LinkWater will complete in the 2012/13 financial year the 'ground truthing' and the CAD to GIS projects. The ground truthing project aims to locate, through survey, inherited infrastructure along with the characteristics for the infrastructure which is then updated in the GIS. A majority of drawings held by LinkWater have been inherited from local governments. These are in varying formats and a considerable portion were in CAD or PDF files. The CAD to GIS project involves evaluating the varying as-constructed CAD drawings and where possible migrating this information into GIS.

This project involves two phases:

- Phase 1 (2011-12) – screening of inherited drawings into those that can be linked to the GIS with no or minor manipulation and then linking these to the GIS
- Phase 2 (2012-13) – linking to the GIS those CAD that can be reasonably manipulated.

Linking CAD to GIS will give LinkWater staff the capability to easily access detailed design and 'as constructed drawings' in a timely fashion. This will assist in emergency situations such as flooding or asset failure.

The GIS system is a primary tool for the development of the LinkWater WSAP as it will be integral in undertaking spatial analysis to develop network infrastructure planning solutions and for map production to illustrate key planning outcomes.

5. Response to the South East Queensland Water Grid Manager's Interim Statement

5.1. Disinfection Improvement

5.1.1 Sparkes Hill Reservoirs

In response to identified problems in maintaining disinfection residuals at the Sparkes Hill reservoirs, LinkWater has undertaken a study to assess the necessary infrastructure upgrades to boost chloramine residuals at this location. This study identified the necessity to improve mixing at these reservoirs in the first instance.

Mixers have now been purchased and are awaiting installation. Following a review of the effectiveness of improved mixing the study highlights it may be necessary to install chloramine boosting. The study highlights high level options of how this can be achieved which will be progressed further in the event boosting is required.

5.1.2 Kuraby Reservoir

In response to identified problems in maintaining disinfection residuals at the Kuraby reservoirs, an improved mixing project was completed in late 2011. The effectiveness of this improved mixing on disinfection residuals is currently being assessed. A study is also due to be completed prior to the end of the financial year looking at infrastructure upgrades which will be necessary in order to boost disinfection residuals at this location as well to facilitate the provision of free chlorine into the Allconnex network.

5.1.3 Narangba Reservoirs

In response to identified problems in maintaining disinfection residuals at the Narangba reservoirs, an improved mixing project was completed in late 2011. The effectiveness of this improved mixing on disinfection residuals is currently being assessed.

5.1.4 Water quality monitoring and research

LinkWater is also realising the benefits of the on-line water quality instrumentation which has been installed throughout the bulk network. This information which is provided in real-time to the LinkWater Control Room enables an immediate response to deviations in disinfection levels. In addition to on-line instrumentation, LinkWater has installed 158 sample points throughout the SEQ Water Grid from which samples are taken on a weekly basis.

These samples are analysed by LinkWater's laboratory services and results provided to LinkWater through our Laboratory Information Management System and analysed by our water quality analysts to ensure disinfection levels are being managed appropriately and immediate operational responses are made to deviations from the quality targets as specified in LinkWater's approved Drinking Water Quality Management Plan.

LinkWater is improving its ability to predict changes in disinfection levels through investment and research in advanced water quality monitoring. Advanced instrumentation which is able to predict chlorine demand in real-time has now been installed at three locations throughout the SEQ Water Grid. A further six locations will have instrumentation installed by the end of the financial year.

In addition to the ability to predict chlorine demand these analysers also have the ability to monitor other parameters at extremely low levels which have historically only been able to be analysed in a laboratory, e.g. nitrite and nitrate, which will further improve LinkWater's ability to maintain disinfection levels throughout the SEQ Water Grid using existing infrastructure therefore only requiring infrastructure upgrades as a last resort.

Further research and development of advanced water quality monitoring aimed at meeting the requirements of the downstream Distribution Retailers is proposed for the 2012-13 Financial Year.

5.2. South McLean/South Logan/Beaudesert/ Canungra Area

In 2009, the QWC engaged WorleyParsons to investigate the future water supply options to standalone communities in the Scenic Rim. This work assumed that the design and construction of the proposed Wyaralong water treatment plant (WTP) would proceed in the immediate future. The outcome was the Investigation of Scenic Rim Piped Water Supplies (WorleyParsons, January 2010).

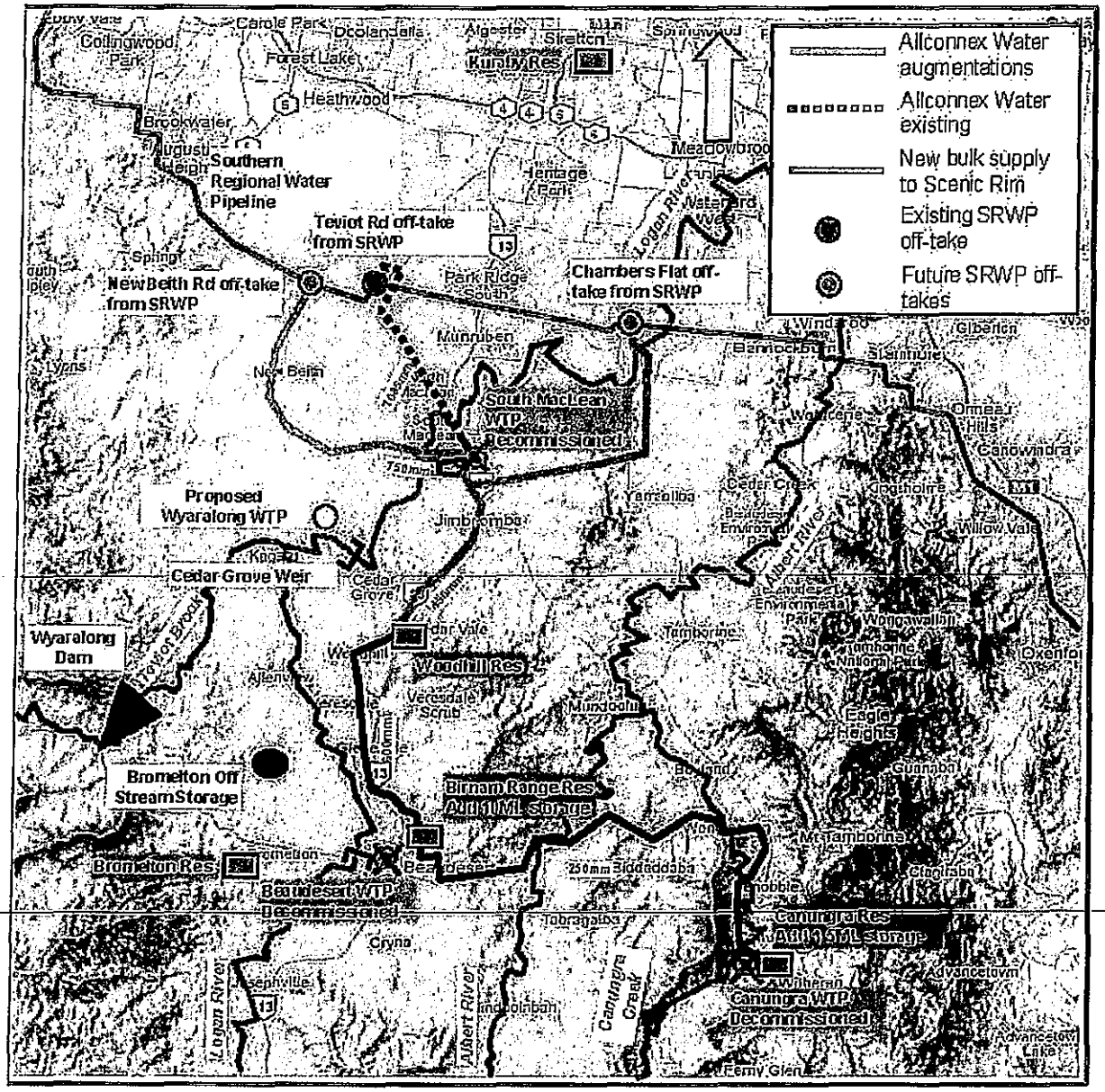
In April 2010, the QWC engaged WorleyParsons to update the original report. WorleyParsons completed the report 'Proposed Water Supply Options to Stand Alone Communities in the Scenic Rim' (WorleyParsons, February 2011).

At that time both investigations identified a pipeline to Beaudesert and then on to Canungra as the best 'Whole of SEQ Water Grid' means of meeting the LoS objectives for Beaudesert and Canungra. This will be reviewed as part of the QWC collaborative planning in the Scenic Rim. A locality map is provided as **Figure 1**.

The Scenic Rim (WorleyParsons, February 2011) identified an opportunity to use the AllConnex Water (Allconnex) distribution infrastructure as part of the delivery solution. This involves using the three connection approach, shown in **Figure 1**, to the Southern Regional Water Pipeline (SRWP) as a means of supplying water to the Woodhill reservoir.

The three connection approach supplies water to South Logan and the Scenic Rim through the use of the existing and upgraded AllConnex network. The approach is a trunk main arching from the SRWP at Spring Mountain to South McLean back to Chambers Flat Road on the SRWP along with a central trunk main from Munruben on the SRWP through South McLean to Woodhill. The proposed Scenic Rim pipeline would be connected at Woodhill.

Figure 1 – Scenic Rim locality map



Allconnex was in the process of replacing an existing trunk main to the Woodhill reservoir with a 375 mm pipe for its distribution needs. Allconnex supported the pipeline solution to the Scenic Rim by increasing the size to a 450mm pipe at an additional cost to Allconnex of $500,000. The original proposal of supplying water to the Woodhill reservoir involved the connection from the Wyaralong WTP to South Maclean at a cost of $35 million. This is a significant 'Whole of SEQ Water Grid' saving.

The QWC has advised Government that a water supply solution to Beaudesert and Canungra would be in place by June 2014.

LinkWater has been assisting in a QWC collaborative planning project to ensure reliable water supply to the stand-alone communities in the Scenic Rim. Other participants are Allconnex, Queensland Urban Utilities, Seqwater and the SEQ WGM.

The SEQ WGM has produced water supply specification, which set out the volume, quality and reliability requirements for supplies to Beaudesert and Canungra. The next stage involved the assessment of a range of options for meeting the specification, including:

- Upgraded or replacement WTPs at Beaudesert and Canungra
- Supply of SEQ Water Grid water via the SRWP and Allconnex network to Woodhill, together with new pipeline connections from Woodhill to Beaudesert and Beaudesert to Canungra.

LinkWater provided the collaborative planning team with an update on the regional and subregional water balances and options being developed. The preliminary cost model also was provided for comment. The cost assessments are to include capital, operational, decommissioning and ongoing savings associated with each option considered.

Costing for the pipeline and stand alone supply options for Beaudesert and Canungra have been produced by LinkWater/Allconnex (pipeline) and Seqwater (WTP) and a financial model produced by LinkWater for all the options and combinations.

As part of the pipeline option, LinkWater has proposed using the non operational Bethania to Beaudesert rail corridor for the pipeline from the Woodhill reservoir to Beaudesert. This will assist to minimise environmental impact and costs. LinkWater has met with the Department of Transport and Main Roads (TMR) to discuss using the rail corridor. TMR is receptive to allowing LinkWater to install a pipeline. The corridor currently contains rail infrastructure that TMR is requiring Queensland Rail to remove.

As at the finalisation of this Interim Statement a decision has not been reached on the most appropriate 'Whole of SEQ Water Grid' option.

Given the early stages of this project and the steps to deliver it (e.g. feasibility study, business case, Government approval, statutory approvals and construction) the June 2014 timeframe is a challenging deadline. To achieve commissioning by June 2014, statutory approvals and engineering design must be completed by June 2013.

5.3. New Connections to Southern Regional Water Pipeline

The SEQ WGM Interim Statement makes reference 'to the need for two new connections in the Flagstone and Beenleigh areas due to predicted growth in the area' as contained in the Allconnex submission. The Flagstone connection involves the commissioning of the existing Beaudesert (New Beith) off-take from the SRWP (registered meter M-101-BT). This off-take was constructed in conjunction with the SRWP and has been awaiting the construction of the downstream infrastructure.

Allconnex is progressing with detailed design of this downstream infrastructure with delivery scheduled for early 2013. Current planning indicates that this off-take may require a capacity upgrade in the medium term (+5 years); however, there are no material works required by LinkWater for this off-take during 2012-13.

Preliminary, high level discussions have been held between LinkWater and Allconnex about the new Beenleigh off-take. As noted in the SEQ WGM Interim Statement, the provision of a new off-take must be based on a robust assessment that demonstrated that this is the best 'Whole of SEQ Water Grid' solution. It is expected that there will be ongoing discussions between LinkWater and Allconnex to progress the planning for the long-term supply to the Beenleigh area during the 2012-13 period; however, there is currently no criticality in the timing for a new Beenleigh off-take from the SRWP and there is not expected to be any material works required by LinkWater during this period.

5.4. Molendinar Area – Upgrades

Seqwater and Allconnex propose pipework reconfiguration at Molendinar WTP site to assist with fluoride control by ensuring that all supplies pass through a reservoir prior to entering the distribution network and to additionally improve the operation of the pump station that supplies the Gold Coast northern water supply districts (M01).

As a key stakeholder, LinkWater has been involved in the planning workshops relating to the proposed pipework modifications and is expected that there will be a requirement to provide operational support during the actual tie-in of these new works; however, there are no specific material works required by LinkWater for this project during 2012-2013.

5.5. Redlands Area

As noted in the SEQ WGM Interim Statement, in conjunction with all other key stakeholders, LinkWater has been involved in planning for the Capalaba WTP demand zone. Prior to this, LinkWater developed a Bulk Water Infrastructure Master Plan to assess the ultimate bulk water transport requirements for the Redland City Council area. The development of this Master Plan was initiated primarily to assess the network implications of the Kinross Road Major Development Area (MDA), refer Section 5.6.

As further noted in the SEQ WGM Interim Statement, given the current demands in the Redlands City area, there are no requirements to augment network capacity in the short to medium term. As such, there are no specific material works required by LinkWater for the Redlands area during 2012-13.

5.6. Mt Cotton – New Connection

The SEQ WGM Interim Statement makes reference to the provision of a new bulk water supply point at the intersection of Boundary Road and Taylor Road, Thornlands. This new bulk water supply point has been programmed to feed the Kinross Road MDA and is consistent with the Redland City Council structure plan and recent LinkWater and Allconnex planning.

The Kinross Road MDA includes a number of high elevation areas (~70m Australian Height Datum) such that supply is required to be from the Mount Cotton reservoir complex. Given the nature of the existing supplies into the Allconnex Redlands areas along the same bulk water main, it is envisaged that the off-take will consist of only a tee and a valve with all downstream infrastructure constructed by Allconnex. As such, there are no specific material works required by LinkWater for this project during 2012-13.

5.7. Image Flat – New connection

Seqwater's Image Flat WTP supplies water to several of the Unitywater supply zones in the Nambour area and also the eastern coastal region. The plant currently produces 18 megalitres per day (ML/d), with a maximum operating capacity of 25ML/d. There is no supply redundancy in the event of plant failure or water quality issues.

An off-take directly from the Northern Pipeline Interconnector (NPI) - Stage 2 will increase security of supply for Nambour area and surrounds, and allow for the delay of the Image Flat WTP upgrade.

During planning of the NPI – Stage 2, discussions were held with Unitywater about possible future off-take locations along the NPI – Stage 2 alignment to provide water to its systems. The preferred site at the Nambour Showgrounds was selected and a blank tee installed at this location to provide for these future works.

KBR was commissioned by LinkWater in August 2011 to undertake an options assessment study for the future of the Nambour off-take from the NPI. The required infrastructure for two different supply requirements was assessed and the total cost of implementation for each option was presented.

The first option is aimed at deferring an upgrade to the Image Flat WTP by supplementing supply to the Image Flat zone. The coastal regions of the Image Flat supply zone would be supplied with water from the NPI and in turn, the demand placed on the WTP would be reduced and an upgrade could be deferred.

The second option is to supply the entire Image Flat water supply zone with water from the NPI. The Image Flat WTP could be taken offline for extended periods of time until the demands exceed the off-take's supply capacity of 30ML/d.

On the basis of the KBR study and LinkWater's operational understanding of the SEQ Water Grid, in particular the NPI, the following conclusions were reached:

- A 375mm off-take from the NPI - Stage 2, to provide a supplementary supply into the Image Flat demand zone of up to 18ML/d, is estimated to cost $1.4 million
- A 500mm off-take from the NPI – Stage 2, to provide an alternative supply of up to 30ML/d into the Image Flat demand zone in the event that the WTP was unavailable, is estimated to cost $1.75 million
- The 375mm off-take defers distribution infrastructure, estimated to cost $10 million, which delivers a cost saving to Unitywater customers
- The 500mm off-take delays Image Flat WTP upgrades estimated to cost $25 million. This is a cost saving to Unitywater and SEQ Water Grid customers.

LinkWater recommended to the SEQ WGM that the estimated $1.75 million 500mm off-take option is the most appropriate on the basis that:

- The off-take increases the resilience of water supply to the Image Flat zone

- The $0.35 million cost difference between the 375mm and 500mm off-takes is justified by improved operational flexibility and potentially delaying future water infrastructure upgrades.

A letter of endorsement for the preferred option was received by LinkWater on 1 February 2012 from the SEQ WGM.

LinkWater has commenced the detailed design, obtaining statutory approvals and land access. It is anticipated that the detailed design will be completed in March 2012 and the remaining activities by June 2012. This project will then be in a position for construction to commence when funding approval is obtained through the 2012-13 Queensland Competition Authority submission.

6. Additional significant LinkWater infrastructure activities

6.1. Desalination corridor study

The South East Queensland Water Strategy identifies the need to implement climate independent and climate resilient water sources that can efficiently meet the needs of the growing population of SEQ. Desalination is an option that is considered to provide a climate independent supply.

The QWC requested LinkWater to investigate and report on the potential pipeline corridor connections from the proposed Marcoola, Lytton and Bribie Island desalination plants sites to the SEQ Water Grid. The QWC had previously identified Marcoola and Lytton as priority sites and Bribie Island had been listed as a reserve site (**Figure 2**).

This work was completed in 2011 with the preferred pipeline corridors identified through a comprehensive multi-criteria assessment process (Desalination Corridor Study Route Selection Report). Subsequent to this study, a 'low-level' preliminary assessment has been undertaken of the design requirements and constraints for these preferred corridors, provided as **Figures 3, 4 and 5** for Marcoola, Lytton and Bribie Island respectively, with the key study objectives being:

- Preliminary design report outlining the general design basis and requirements for the pipeline and associated infrastructure
- Operation and control requirements
- Connections and interfacing with existing infrastructure and control systems
- Cost estimates capital and operation costs to a concept design level (± 30%)
- Preliminary design for the pipes and related infrastructure.

Once the preferred desalination plants site is identified by the QWC, the 'low-level' preliminary designs outlined in this phase of the project will need to be developed to a full Preliminary Design standard. Some additional elements that will need to be addressed for this project to be developed to full Preliminary Design standard include:

- Specific hydraulic considerations, such as various modes of operation for pump stations

Figure 2 - Marcoola and Lytton priority sites and Bribie Island reserve site locality map

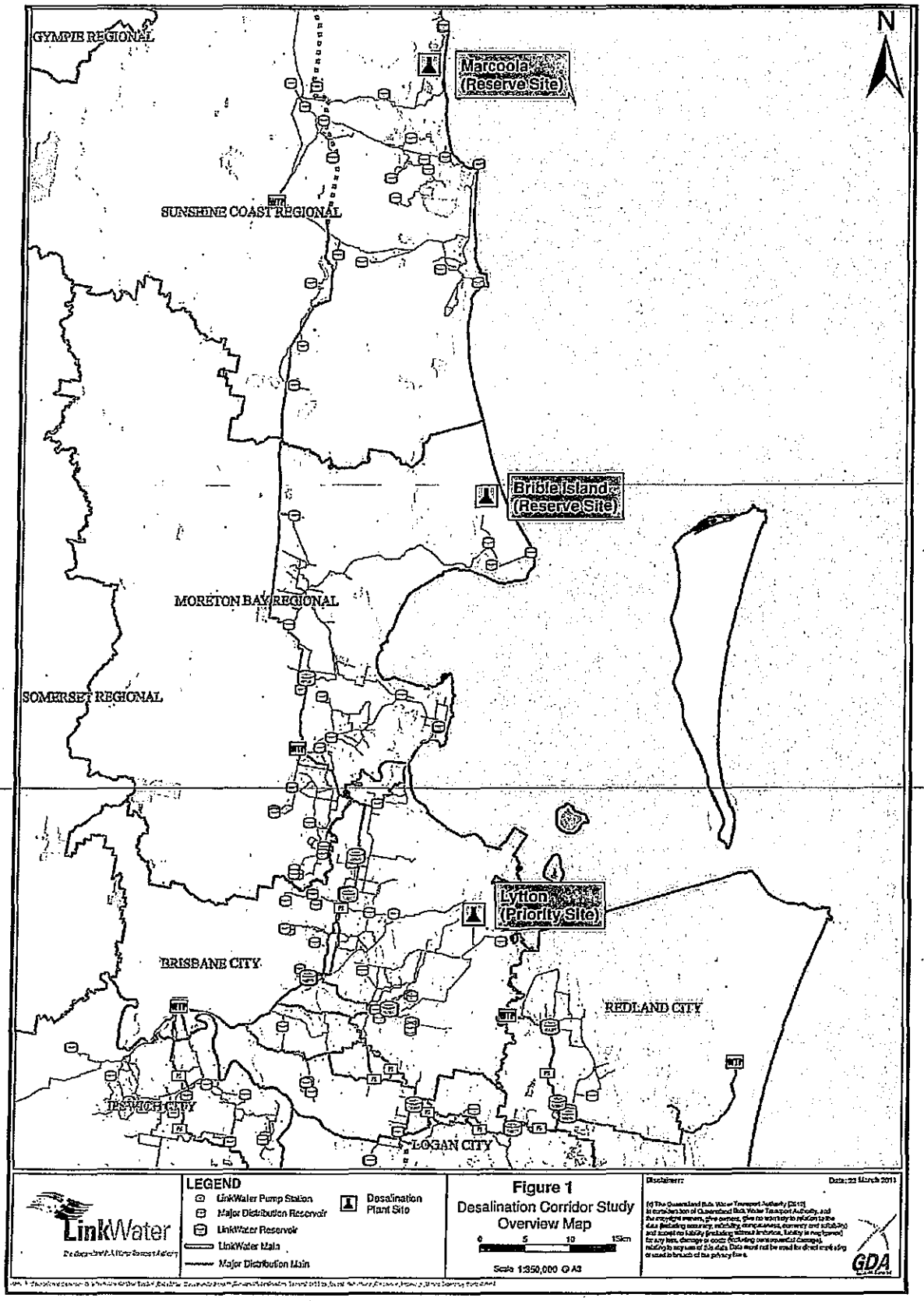


Figure 3 – Marcoola preferred corridor alignment

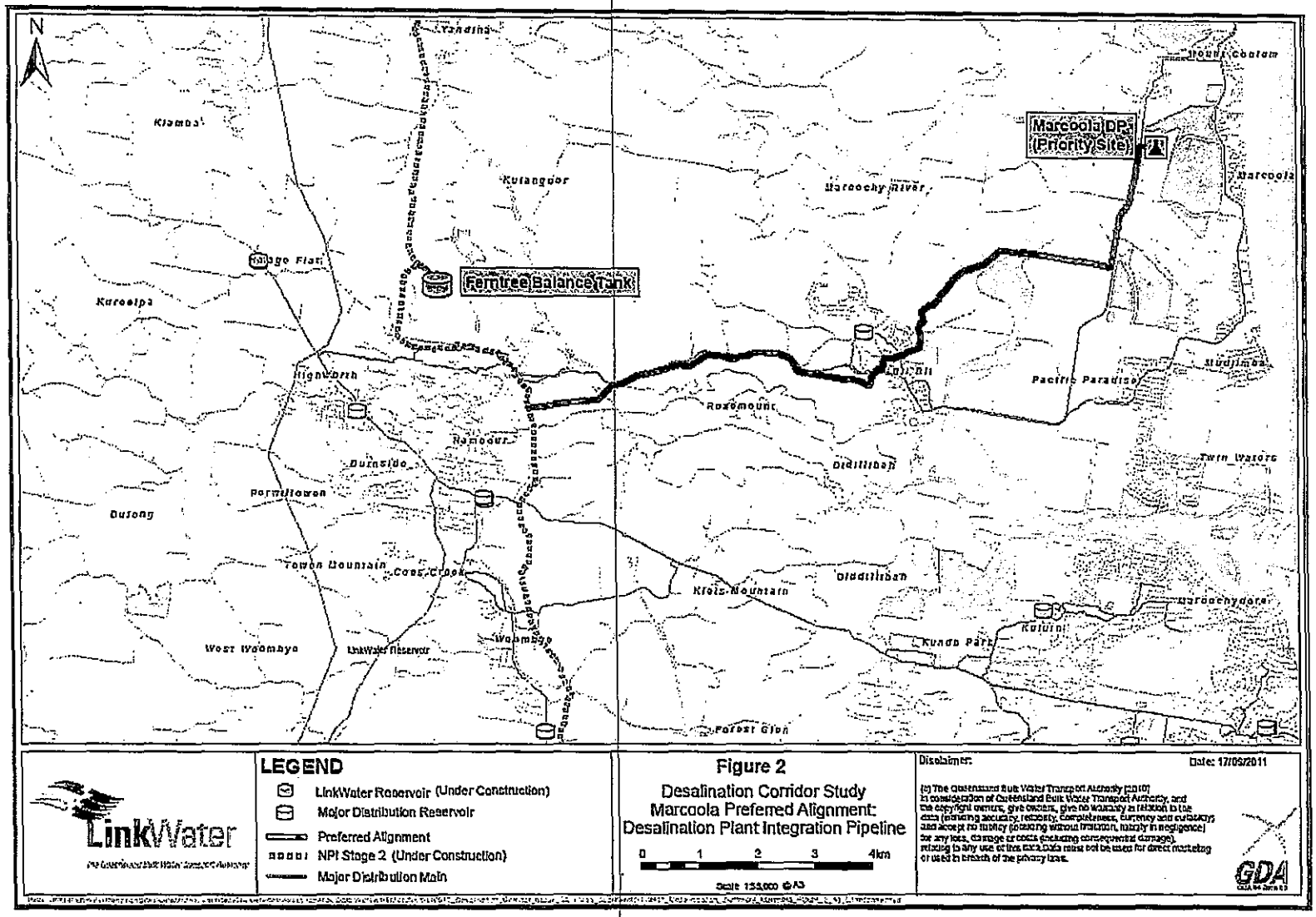


Figure 4 – Lytton preferred corridor alignment

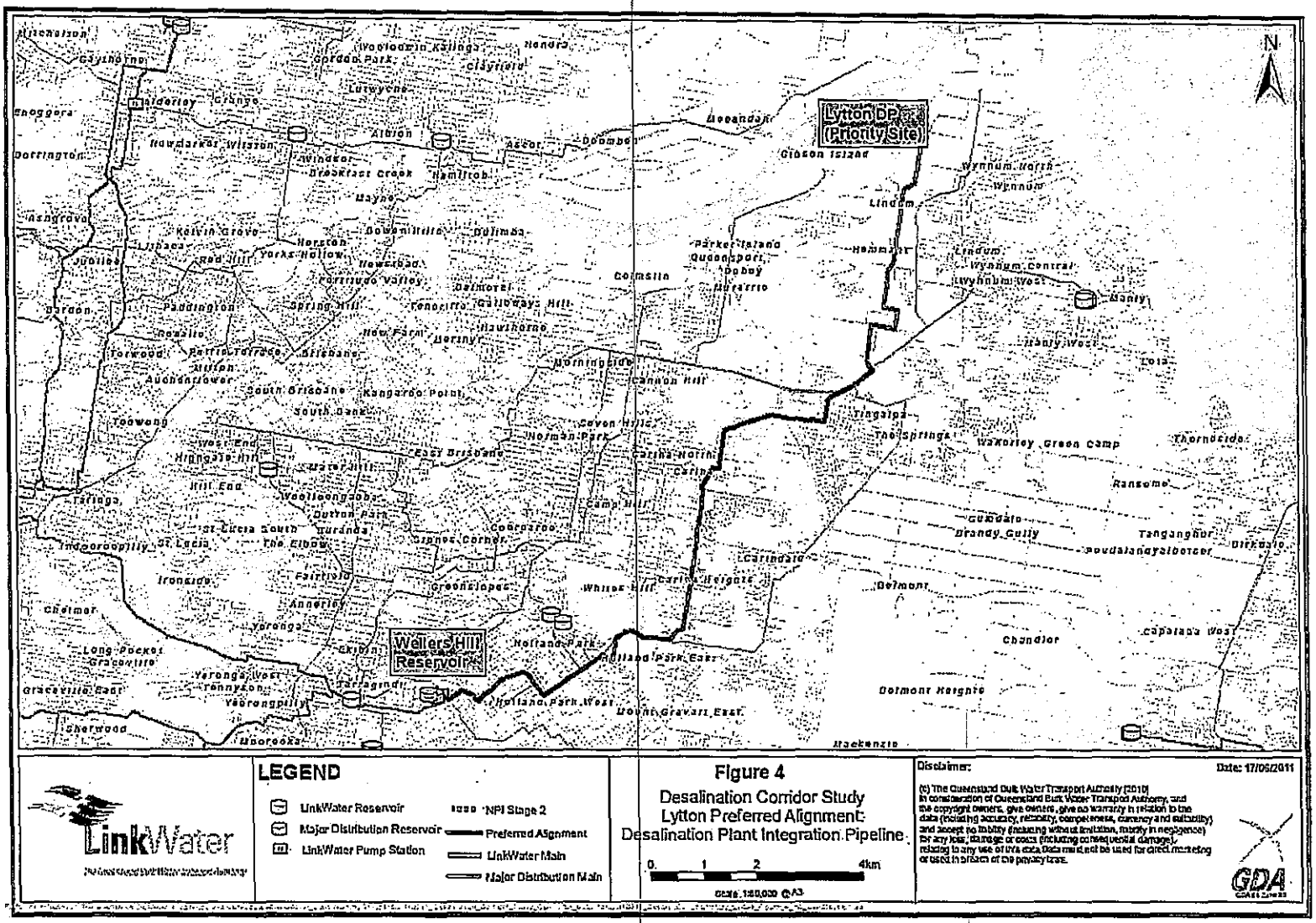
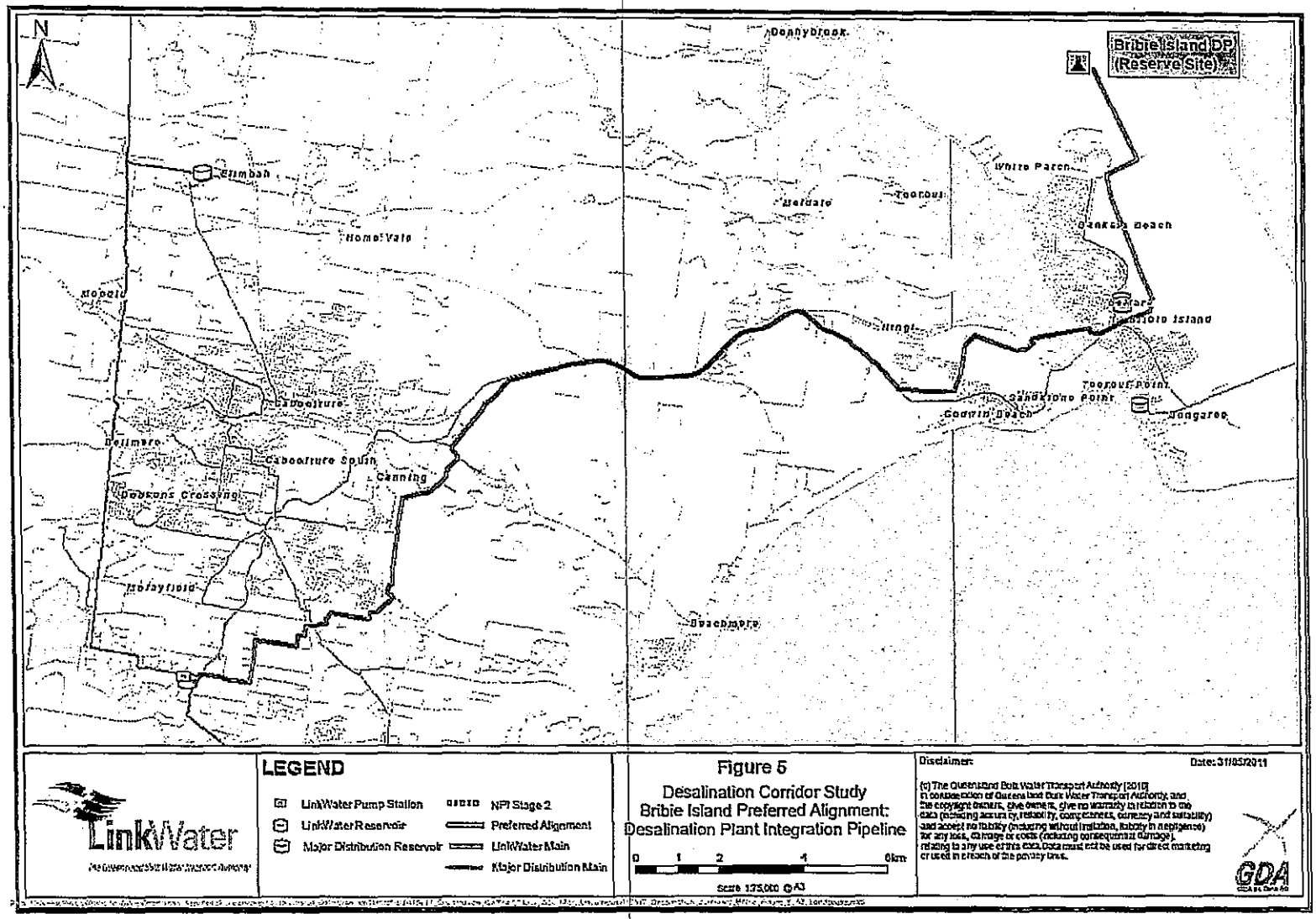


Figure 5 – Bribie Island preferred corridor alignment



- Hydraulic constraints for valves, flowmeters and other infrastructure installations
- Detailed flow algorithms based on a more comprehensive range of operating based on projected network demands at the time of implementation
- Safety in Design and Risk Assessment Reviews to be incorporated into the design process
- Refined construction costs, including land acquisition, community negotiation costs, relevant surveys and construction contingency margins.

The following information summarise the results and recommendations from the Corridor Selection and Preliminary Design Reports.

The optimum, long-term water balance within the SEQ Water Grid includes an ultimate capacity of 400ML/d from the northern desalination plants sites, combined with 200ML/d from the Lytton desalination plants site. This is based on current bulk water infrastructure as well as existing and projected future water demands on the Sunshine Coast.

The optimum water balance can be achieved by implementing desalination plants with production capacity of at least 200ML/d at Marcoola and Lytton in the medium term. Desalination plants with production capacity of 400ML/d and 200ML/d at Marcoola and Lytton, respectively, would be required to meet the long term projected regional water demand. Alternatively, desalination plants with production capacity of 200ML/d each, at Marcoola, Lytton and Bribie Island, would be sufficient to meet the long term projected demand.

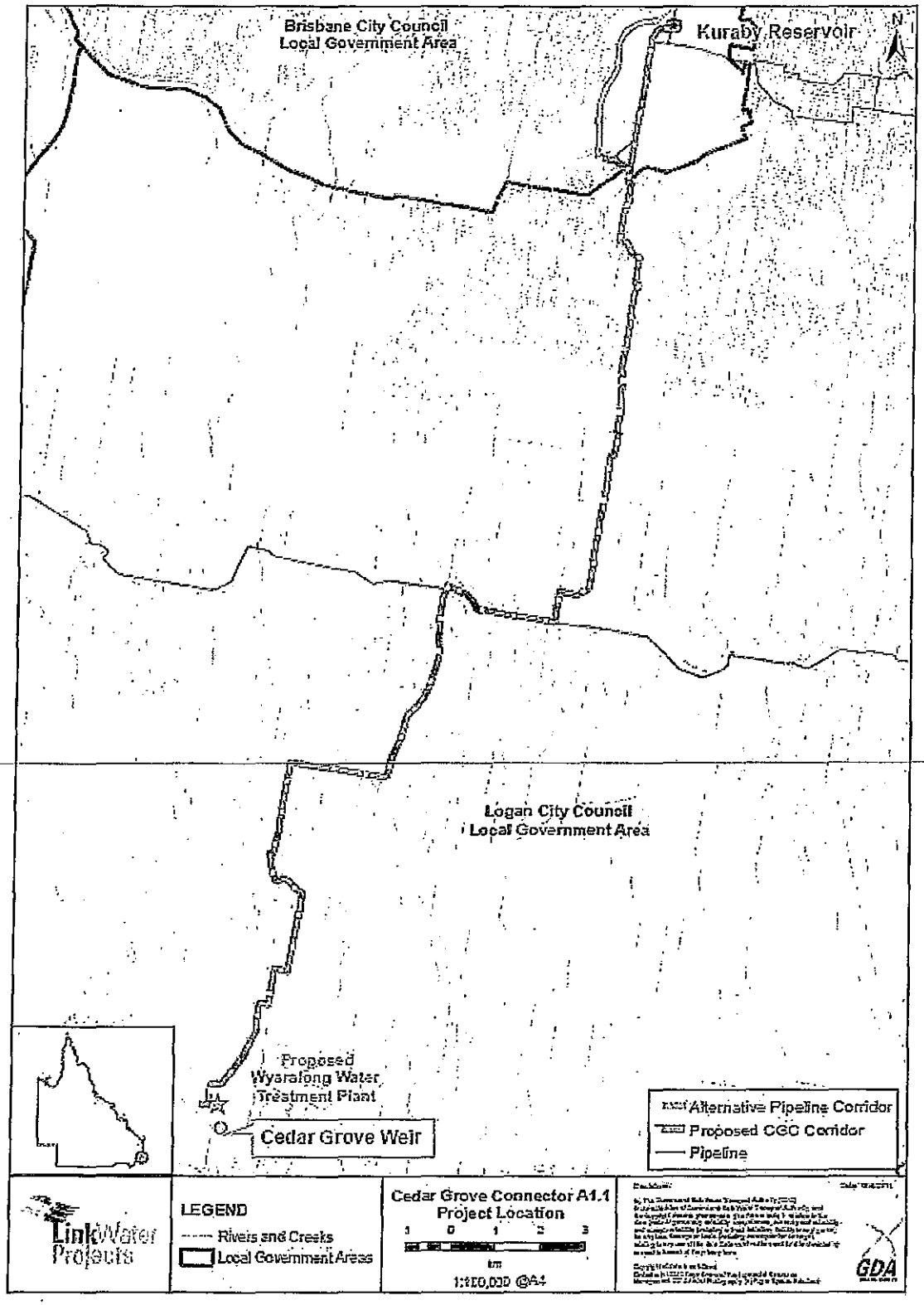
Initially, a transport volume of 50ML/d from the Marcoola (or Bribie Island) site could be accommodated through the existing SEQ Water Grid infrastructure. This would have the benefit of reducing the initial capital outlay whilst also allowing for additional growth in the southern and central area of the SEQ Water Grid before the Lytton desalination plant was constructed. However, the Marcoola site offers distinct water quality benefits over the Bribie Island site by providing an increased flow through the NPI and reducing water detention times. The actual implementation will be determined by bulk water demands associated with regional growth, or as part of a drought response measure.

6.2. Cedar Grove and Karawatha inter-connector project

LinkWater was directed under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) to undertake planning and investigation activities for a pipeline between the proposed Wyaralong WTP to the SRWP and then to the Kuraby Reservoir. This is described in the legislation as the Cedar Grove and Karawatha inter-connector project. This project involves the construction of approximately 32 kilometres (km) of large diameter (nominally 1085mm) underground pipeline. A locality map is provided as **Figure 6**.

Operational constraints mean that the SEQ Water Grid cannot currently deliver the full production potential of its existing bulk water supply infrastructure to all parts of the SEQ Water Grid. Elements of this project, such as the Kuraby leg of the pipeline, will remedy this situation, improving the efficiency of the SEQ Water Grid and enhancing network resilience.

Figure 6 – Cedar Grove Connector locality map



This project involves the construction of approximately 32km of large diameter (nominally 1085 mm) underground pipeline connecting the proposed Wyaralong WTP to the SRWP and then to the Illaweena and Kuraby Reservoirs. The pipeline will provide opportunity for a number of off-takes to meet growing urban and rural residential centres along the pipeline.

The Regional Water Security Program for South East Queensland – Revision 1 (March 2010), advises the target construction completion as the 31 December 2012. The Cabinet Budget Review Committee has decided to defer the construction of this project to no earlier than 2014-15. The project scope and timeframe is now achieving a construction ready project by 2014-15. This project aims to:

- Meet current and future regional water demand by connecting the Wyaralong Dam water source
- Enhance water security in SEQ by increasing bulk water supply sources
- Improve the SEQ Water Grid's resilience by providing flexibility in operation.

The Environmental Impact Statement and preliminary design are scheduled to be complete late 2012. Activities following this timeframe will include regulatory approvals, and pending approval of additional funding, the acquisition of land.

There may also be direct benefits for the local communities, which will be further defined as the planning phase of this project progresses. A number of off-takes may be incorporated along the pipeline route to support future developments in Park Ridge, Jimboomba, Yarrabilba and Greater Flagstone.

The Commonwealth Department of Sustainability, Environment, Water, Population and Communities has determined this project as a 'controlled action' and is to be assessed for approval under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Office of the Coordinator-General (OCG) has advised that this project is unlikely to be declared a significant project under the SDPWO Act. The OCG has also advised that should LinkWater request this project be declared a 'Critical Infrastructure' and 'Prescribed' project under the SDPWO Act, it would endorse this request. An assessment strategy paper has been developed proposing a preferred assessment pathway for the project. This generally follows a voluntary Environmental Impact Statement.

In conjunction with the preliminary design, Linkwater is undertaking a desktop fatal flaws study of a pipeline corridor between the proposed Wyaralong WTP and the Wyaralong Dam. This will ensure that the proposed Cedar Grove and Karawatha inter-connector can be extended from the Wyaralong WTP to the Wyaralong Dam. The extension may be required as a result of raw water quality from the dam or WTP flood immunity concerns.

Appendix 1

South East Queensland Water Grid Manager's and Distribution Retailers Interim Statements

SEQ Water Grid manager

Secure and efficient water through partnership and innovation

TRIM ref: D/12/165

18 January 2012

Ms Karen Waldman
Chief Executive Officer
Queensland Water Commission
PO Box 15087
CITY EAST QLD 4002

KAREN

Dear Ms Waldman

RE: SOUTH EAST QUEENSLAND SYSTEM OPERATING PLAN – INTERIM ARRANGEMENTS

In accordance with Schedule 5, Section 5 (b) of the SEQ System Operating Plan, attached is the SEQ Water Grid Manager's Interim Statement.

This statement covers the issues raised by each of the SEQ Distributor-Retailer Entities, as well as some additional matters that may have a material impact on the need for new or upgraded bulk water supply works to be considered in 2012–13 that the SEQ Water Grid Manager has identified through previous assessments.

If you require any further clarification please contact Grant Horton, A/Director Operations on 3247 4463.

Yours sincerely

[redacted]

Barry Dennien
Chief Executive Officer

Copies:
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CEO, LinkWater
CEO Allconnex Water
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CEO, Queensland Urban Utilities

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ABN. 14 783 317 630

Allconnex Water is requesting improvements in the level of disinfectant residual supplied at bulk water supply points, as well as on-line monitoring, particularly where water is blended or the source alternates. This matter can be addressed through various mechanisms including changes to operational approaches within the capability of the current infrastructure as detailed below, as well as by potentially new or upgraded bulk water supply works.

Current Actions
Operational improvements in the existing bulk water supply network are being investigated and trialled. These include installing reservoir mixers at Alexandra Hills and Kuraby reservoirs, increasing chlorine dosing at Tugun, Molendinar and Mudgeeraba, running the Eastern Pipeline Interconnector in an easterly direction to improve flows through the Logan area and supplying some of the lower Logan area directly from the Southern Regional Water Pipeline (SRWP).

Operational improvements are also being investigated and trialled in Allconnex Water's area, including more frequent flushing and cleaning of reservoirs, operating reservoirs at lower levels to minimise water age, installation of reservoir mixers and permanent re-chlorination stations, as well as targeted chlorination flushes of key parts of the (chloraminated) reticulation system to remove nitrifying bacteria.

Studies on chloramine stability have also commenced, led by LinkWater and including Seqwater and QUU, to explore further operational changes that will improve chloramine stability from the water treatment plant to the consumers tap. The WGM has also investigated longer term disinfection options, and water quality goals (starting with minimum disinfection residual), for the Grid as a whole. To look at options for long term disinfection strategies across the Water Grid, the WGM has commissioned a study titled SEQ Water Grid Disinfection Options Study. This study has been undertaken in collaboration with Grid Participants.

Additional matters for consideration
Due to the current investigations, actions and operational improvements being undertaken across the Grid to improve disinfection residuals, the WGM considers that the following items are additional matters that may impact the need for new or upgraded bulk water supply works to be considered in 2012–13:

- the Water Grid Disinfection Options Study to be completed in early 2012
- the review of outcomes of the various operational improvements mentioned under the "Current Actions" heading above.

In summary, due to various contributing factors including lower demands, maintaining disinfectant residuals has become more difficult, and operational changes are being trialled and implemented to improve the process. The WGM considers that these operational changes need to be fully explored and outcomes assessed as part of consideration of the need for new or upgraded bulk water supply works in 2012-13.

demand predictions and current demands to minimise premature investment. From the information provided thus far, it is unclear whether this matter requires detailed design, construction or preliminary consideration in 2012–13.

Molendinar Area – Upgrades

Matter
Operational issues have been identified in relation to excessive pressures and fluoridation at the M04 Pump Station at the Molendinar Water Treatment Plant complex which may impact on the need for new or upgraded bulk water supply works to be considered in 2012-13.

Current actions
Preliminary discussions between Allconnex Water and LinkWater have commenced.

Additional matters for consideration
The WGM supports improvements necessary to address matters such as these, and relies on the Grid Service Providers to negotiate and determine the best solution.

Redlands Area

Matter
Allconnex Water hase identified that the eastern link currently owned by Allconnex Water is an essential component of the longer term planning for the Redlands area, and should be purchased by LinkWater. This is not so much a matter that may impact on the need for new or upgraded bulk water supply works, but may influence the transfer of an existing group of assets. The WGM has also identified this area as having potential capability issues within the next five years.

Current Actions
Early discussions have commenced regarding maintenance requirements for Capalaba Water Treatment Plant and sizing requirements. These discussions have been initiated by Seqwater, and have involved representatives from LinkWater, WGM, Allconnex Water and Seqwater.

Additional matters for consideration
A sub-regional supply strategy is required in this area. The following items are matters that may be considered in such a strategy, and that may impact the need for new or upgraded bulk water supply works to be considered in 2012–13:

- Water quality issues in relation to the Capalaba Water Treatment Plant are being managed in part through the SEQ Water Grid Annual Operations Plan and monthly Grid Instructions by blending with alternative supplies, and reservoir management being undertaken by LinkWater and Allconnex Water.
- Based on current demands, the WGM does not see any need for significant capital expenditure to make available additional capacity in 2012–13, unless specifically required due to maintenance issues.

Matters identified by the WGM

The Annual Market Rules Review 2010–11 section 8.5 also identified a summary of issues to be investigated. Of the items raised in the Annual Market Rules Review Report, the following matters have not been identified by the SEQ Distributor-Retailer retailer entities and may have a material impact on the need for new or upgraded bulk water supply works to be considered in 2012-13. In addition, through discussions with Grid Participants, a range of other matters have been raised that have informed in part the matters listed below.

Mt Crosby water treatment plants

Matter

These plants are critical to provision of continuity of supply to many parts of the Grid. Experience has shown that there are occasions where, due to water quality issues, the output of the plant needs to be reduced to ensure the continued supply of water at required standards, largely targets for some aesthetic parameters. Fluctuation in raw water quality and the capability of Mt Crosby to deal with some issues may have a material impact on the need for new or upgraded bulk water supply works to be considered at Mt Crosby Water Treatment Plants in 2012–13.

In addition, the following matters may have an impact on the need for new or upgraded bulk water supply works to be considered in 2012-13:

- The full capability of 916 ML/day from the Mt Crosby Water Treatment Plants will not be required for many years.
- The connectivity of the Water Grid provides the flexibility to minimise the effect of certain aesthetic issues through blending; however, there is a minimum requirement for Mt Crosby Water Treatment Plant that needs to be provided at all times.
- This minimum requirement will grow over time as demands in the greater Brisbane area grow.
- The current average production figure from this plant is 260ML/day, of which 150-200 ML/day is required as a reliable minimum.

Current Actions

The WGM was briefed some time ago at the preliminary stages of identification of potential issues to be addressed through future planning activities.

South Maclean Water Treatment Plant

Matter

Reliability and water quality issues have been identified at this plant, which consequently operates on a minimal basis.

Unitywater

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Ms K. Waldman
Chief Executive Officer
Queensland Water Commission
PO Box 15087
City East QLD 4002

9 December 2011

Dear Karen

SEQ System Operating Plan Revision 4.0 Interim Statement

The purpose of this letter is to fulfil the requirements of Schedule 5 (5) (a) of the SEQ System Operating Plan - Revision 4.0 regarding the making of an Interim Statement. We understand that Unitywater are required to advise QWC, the SEQWGM, Seqwater and LinkWater on any matters that may have a material impact on the need for new or upgraded bulk water supply works to be considered in the 2012-13 financial year.

In relation to an Interim Statement, we can advise that we have no requirement in 2012-13 for any additional bulk supply connections - over and above the existing arrangements - in order to service the anticipated growth in demand in the Moreton and Sunshine Coast regions. We are not planning for any major reconfiguration of our Demand Zones as defined under Section 4.3 of the Market Rules SEQ Water Market during the 2012-13 financial year.

The following exceptions apply to the above statement;

1. There are various hydraulic, water quality and operational planning exercises being undertaken by the bulk entities which, if implemented, could impact on our network. We therefore reserve our right to assess such impacts and, where appropriate, request alterations or additional works in response to any proposed reconfiguration or operational change of the bulk network that may be implemented over the coming financial year.

2. We have previously indicated our desire for the provision of an offtake from the Stage 2 NPI to provide security of supply for customers fed from the Image Flat Water Treatment Plant. We are currently in discussion with Linkwater Officers regarding the possible provision of such an offtake.

We trust the above fulfils the requirements of the SOP. Please feel free to contact Mr Michael Lukin on 5409 3807 if you have any queries.

QUEENSLAND
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Julie Allan
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Dear Ms Allan

South East Queensland System Operating Plan Rev 4.0: 2012/13 Priority Bulk Water Supply Works

This is Queensland Urban Utilities response to the South East Queensland System Operating Plan (SOP) in accordance with Schedule 5, Part 5. Below are matters that Queensland Urban Utilities has identified that may have a material impact on the need for new or upgraded bulk water supply works to be considered in the 2012-13 financial year.

Water Quality – General Disinfection

Queensland Urban Utilities has determined that water quality in the Brisbane and Ipswich service areas would be best served by maintaining a optimising the ~~current regime of chloramination rather than switching to chlorination.~~

Water Quality – Improve Disinfection / pH Control

Queensland Urban Utilities has identified improved pH control at Mt Crosby and North Pine Water Treatment Plants as a key matter to be considered for bulk water supply works in 2012/13. We consider this matter of importance as:

- Maintaining reliable drinking water disinfection levels is essential for safeguarding public health from potential bacteriological contamination;
- We have noted difficulties in sustaining network disinfection levels due to the current pH levels of about 7.5;
- Water supply network disinfection (Chloramination) levels can be more effectively maintained when pH is maintained between 8.1 and 8.6. It is preferable pH is held at 8.4;
- Water supply network disinfection (Chloramination) residuals will persist for longer at a pH of 8.4 and prevent the loss of water supply disinfection safeguards due to nitrification;

Queensland Urban Utilities believes potential options for consideration include:

- At Mt Crosby WTP, the dosing point for pH correction is moved to end of the treatment train rather than as present where pH correction occurs before disinfection; and
- pH control is set to hold a pH of 8.4

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Ms Karen Waldman
Chief Executive Officer
Queensland Water Commission
PO Box 15087
CITY EAST QLD 4002

Dear Karen

South East Queensland System Operating Plan – Interim Arrangements

I refer to the recently revised South East Queensland System Operating Plan which has established new requirements for Distributor Retailers in relation to long term demand forecasts and in the immediate term, advice in relation to any interim arrangements. This advice addresses the requirement under Schedule 5 (5) - Interim Arrangements.

As a general comment, it is recognised that the primary focus of the SOP relates to the volume and location of water demand. Overall, the Allconnex Water service area is supplied from a number of sources within the SEQ Water Grid and is therefore well serviced in terms of meeting overall demand.

To some extent, this abundance of supply sources and an overall reduction of individual consumer demand over recent years has created an accompanying water quality/disinfection challenge for Allconnex Water. It is these disinfection challenges in particular which are top of mind in an immediate context in relation to Interim Arrangements relating to the SEQ Water Grid and heavily influencing demands drawn from particular supply points or sources.

The following is a high level overview of current activities and planning being undertaken by Allconnex Water in liaison with the Bulk Water Supply Grid Participants.

- Disinfection Improvement

  Allconnex Water is working closely with Linkwater in terms of managing low chlorine residual levels in the Logan City area. Significant investment ($2 million) is being undertaken by Allconnex Water in the next two year period to address the issue of low residual levels available at the Bulk Supply Points in the Logan City area.

  Discussions are also active with Seqwater in terms of chlorine residual levels provided from the Molendinar and Mudgeeraba water treatment plants in the Gold Coast area.

Attachment 5: Water treatment plant requirements

Preliminary SEQ WGM operating strategy: 2012-13 to 2016-17

WTP	Function	Entitlement (ML/day)	Current capacity (ML/day)[1]	Capacity requirements to 2016 (ML/day)	Water quality requirements		Reliability requirement (to be determined based on advice from GSPs about current reliability)[6]		Role
					Health	Aesthetics	Minimum Reliable Capacity (MRC)	Maximum Duration at MRC	
Mt Crosby Eastbank	Base	680.0	670.0	450.0	ADWG	Historical performance	TBD. Indicatively 175	TBD. Indicatively 2 days	
North Pine	Base	161.0	200.0	160.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 4 days	
Molendinar	Base	230.0	150.0	150.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively <1 day	
Mudgeeraba	Base		110.0	110.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively <1 day	
Landers Shute	Base	100.0	130.0	130.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively <1 day	
North Stradbroke Island	Base	54.0	26 to 54	30.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 1 day	
Noosa	Base	27.0	45.0	21.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 7 days	
Mt Crosby Westbank	Supplementary	680.0	250.0	150.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 7 days	Supplement supplies from Mt Crosby Eastbank WTP as required
Capalaba[2]	Supplementary	21.0	18 to 54	21.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 7 days	Supply at minimum production, with increased production during local and regional drought conditions
Ewen Maddock	Supplementary	7.9	20.0	20.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 14 days	Supply during seasonal peak periods and otherwise as required, with increased production during local and regional drought conditions
Banksia Beach[4]	Supplementary	5.0	4.2	4.2	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 14 days	Supply at minimum production until demand across subregion > 60,000 ML/a
Gold Coast Desalination Plant	Supplementary	126.0	133.0	126.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 7 days	Stand-by supplies unless required; production at full capacity when key Water Grid storages below 60% of combined capacity
Western Corridor Recycled Water Project		95.9	96.0	47.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 14 days	Full capacity available to augment Wivenhoe Dam from when key Water Grid storages fall to 40% of combined capacity
Esk	Stand-alone	68.0	0.8	1.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Lowood	Stand-alone	15.0	20.0	10.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Beaudesert	Stand-alone	8.7	4.8	2.7	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Kilcoy	Stand-alone	5.0	1.5	1.8	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Boonah-Kalbar	Stand-alone	2.4	3.5	2.1	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Pt Lookout	Stand-alone	1.4	1.7	0.9	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Dunwich	Stand-alone	1.4	1.0	0.5	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Kooralbyn	Stand-alone	1.2	1.9	0.8	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Kenilworth	Stand-alone	0.6	0.4	0.3	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Amity Point	Stand-alone	0.5	0.5	0.4	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Canungra	Stand-alone	0.4	0.4	0.4	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Rathdowney	Stand-alone	0.2	0.4	0.1	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Linville	Stand-alone	0.1	0.5	0.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Somerset Dam (Esk)	Stand-alone	0.1	0.5	0.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Jimna	Stand-alone	0.1	0.2	0.0	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Dayboro	Stand-alone	0.0	1.1	0.5	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Petrie[3, 9]	Stand-alone	19.2	45.0	23.4	ADWG	Historical performance	TBD. Indicatively 0	TBD. Indicatively 2 days	
Albert River WTP	Not required to 2016-17	1.9	0.0						
Aratula WTP	Not required to 2016-17	0.1	0.0						
Maleny WTP	Not required to 2016-17	0.3	0.0						
Woorim WTP (Bribie Island)	Not required to 2016-17	0.0	0.0						
Toogoolawa WTP	Not required to 2016-17	0.0	0.0						
South Maclean WTP	Not required to 2016-17	14.3	6.5						
Woodford WTP[7]	Not required to 2016-17	3.4	3.2						Supply to recommence when key Water Grid storages fall to 40% of combined capacity (depending upon demand at the time)
Caboolture WTP	Not required to 2016-17	11.5	14.3						Supply to recommence when key Water Grid storages fall to 40% of combined capacity (depending upon demand at the time)
Enoggera WTP	Not required to 2016-17	4.7	3.3						Supply to recommence when key Water Grid storages fall to 60% of combined capacity (depending upon demand at the time)
Brisbane Aquifier WTP	Not required to 2016-17		9.6						Supply to recommence when key Water Grid storages fall to 40% of combined capacity (depending upon demand at the time)
Image Flat WTP[8]	Not required to 2016-17	45.2	12.0						Supply to recommence when key Water Grid storages fall to about 40% of combined capacity (depending upon demand at the time)

NOTES

1. As advised to the Water Grid Manager in monthly availability statements and through other correspondence.
2. Longer term supply requirements from the Capalaba WTP needs to be assessed based on the Redlands demand area requirements and upgrade options of the WTP or distribution network, including booster pump options
3. Longer term supply required to be assessed based on ongoing operational and capital costs compared with the cost of connection to the remainder of the Water Grid, by LinkWater or Unitywater
4. Banksia Beach WTP supply required to be assessed based on distribution impacts, including water quality ageing and possible need for additional reservoir
5. Based on predicted MDMM medium series demands
6. Reliability figures are indicative only based on historical performance and knowledge of irregular events. Analysis has included a demand persistence water balance model. A best for grid reliability analysis should be completed prior to significant capital expenditure is committed to improve reliability
7. Detailed reliability assessment of connecting pipeline to be completed, and recommedations implemented, prior to implementing any decision to demobilise this WTP.
8. New operating mode to be implemented following commissioning of connection to the Northern Pipeline Interconnector, with detailed assessment of reliability implications
9. Entitlement listed here only relates to Lake Kurwongbah. In practice, the Petrie WTP can take water released from North Pine Dam, which would technically be accounted for against the North Pine Dam Water allocation.

Attachment 6: Beaudesert and Canungra Service Specifications

SEQ Water Grid manager

Beaudesert and Canungra: Service Specifications

Secure and efficient water through partnership and innovation

Contents

Beaudesert: Grid Customer Specification

The key elements of the Specifications are summarised below.

Supply location: The Specification applies at the existing Bulk Supply Point at the Beaudesert Water Treatment Plant. An alternative Point may be agreed, if and when a new supply is developed or following a request from Queensland Urban Utilities (QUU).

Capacity: The Specification is the supply of water at the Bulk Supply Point to the capacity listed below.

Capacity specification – Beaudesert (ML/day)

	2011	2016	2021	2026	2031
Average	1.6	3.3	4.3	6.1	7.8
MDMM	2.2	4.6	6.0	8.4	10.8

Quality: The Specification is the supply of water at the Bulk Supply Point in accordance with the *Australian Drinking Water Guidelines* (2010) plus the additional parameters and alternative values listed below.

Quality specification – Additional parameters and alternative values.

Performance criteria	ADWG (2010) guideline values	Alternative or additional specifications	Assessment basis[1]
Chlorate (mg/L)	Not specified	< 0.8	95th percentile RPM, tested at least fortnightly
Fluoride (mg/L)	< 1.5	0.7 to 0.9[2]	95th percentile RPM, tested at least fortnightly
Geosmin (ng/l)	"Acceptable to most"	< 10	Mean, tested at least monthly
MIB (ng/l)	"Acceptable to most"	< 10	Mean, tested at least monthly
pH	6.5 to 8.5	6.5 to 7.5	Mean, tested at least fortnightly
Total chlorine (mg/L) (free chlorine plants[3])	< 5	> 2[4]	95th percentile RPM, tested at least fortnightly
Total chlorine (mg Cl as Cl2/L) (monochloramine plants[3])	< 4.1	> 2[4]	95th percentile RPM, tested at least fortnightly
Total THMs (µg/L)	< 250	< 225	95th percentile RPM, tested at least fortnightly
Turbidity (NTU) (bulk supply from WTP)	Not specified	< 0.3	95th percentile RPM, tested at least fortnightly
Turbidity (NTU) (bulk supply from pipeline)	Not specified	< 1	95th percentile RPM, tested at least fortnightly

Notes:

1. RPM is 12 month rolling performance measure.
2. Equals requirement under the *Water Fluoridation Regulation (2008)*.
3. Chlorine is the preferred system for stand-alone supplies. The preferred system for connected supplies is subject to a separate detailed investigation.
4. Upper limit specified by ADWG must also be met.

Reliability: The Specification is the availability to supply water at the Bulk Supply Point so that:

- Supply will always exceed demand under normal operating conditions.
- Due to major bulk water incidents, supply to consumers may be interrupted over the entire suburb for less than 24 hours no more than once every 25 years, on average
- Due to major bulk water incidents, supply to consumers may be interrupted over multiple suburbs for less than 48 hours no more than once every 100 years, on average.

It is anticipated that the reliability specification may be able to be refined through the options assessment process.

Security: The Specification is the availability to supply water at the Bulk Supply Point in accordance with the Levels of Service (LOS) objectives specified in the Regional Water Security Program. Relevant objectives are that:

- During normal operating mode, sufficient water will be available from the SEQ Water Grid to meet forecast demand, including average residential demand of up to 230 litres per person per day.
- Medium level restrictions will not occur more than once every 25 years, on average
- Medium level restrictions need only achieve a targeted reduction in consumption of 15% below the total consumption in normal operations
- It is expected that medium level restrictions will last longer than six months, no more than once every 50 years on average.

Beaudesert: Grid Service Provider Specification

The key elements of the Specifications are summarised below, along with the risk criteria and process to demonstrate compliance.

Delivery location: As per Grid Customer Specification supply location.

Capacity: As per Grid Customer Specification.

Quality: As per Grid Customer Specification. Quality should also be managed in accordance with the other elements of the *Australian Drinking Water Guidelines 2010* (ADWG). This includes the identification of potential hazardous events and ensuring appropriate mitigating options are available.

Reliability: As per Grid Customer Specification. It is a requirement of this specification that a quantitative assessment of overall system reliability can be undertaken, using a Failure Modes, Effects and Criticality Assessment. The assessment should demonstrate how the reliability Specification can be achieved through existing and, if required, proposed infrastructure.

Reliability should be achieved through the combined use of all available treated water storage, including existing and planned distribution assets. QUU is required to maintain sufficient treated water storage to manage shorter duration peaks, including daily variations. The system reliability assessment is to focus on infrequent and severe incidents. For infrequent and severe events, reliability should be assessed based on supplying forecast Average Day demands during the incident.

Water availability: The SEQ Water Grid Manager (WGM) holds multiple entitlements in the Resource Operations Plan area adjacent to Beaudesert that are available for local treatment.

The existing and potential entitlements are sufficient to achieve the Levels of Service (LOS) objectives over the short- to medium-term. The WGM is reviewing management options to maintain security of supply over the longer-term, such as by transferring entitlements from other locations. For the purposes of this assessment, restricted demand is as listed below.

Restricted demand (ML/day)

	2011	2016	2021	2026	2031
Beaudesert	1.4	2.8	3.7	5.2	6.6

The WGM will make a final decision on the use of its water entitlements over the 20 year planning horizon based on an economic assessment of renewing or augmenting related storage, treatment and transport assets; the value of the water resource; customer connection preferences; and the cost of alternative supplies.

Canungra: Grid Customer Specification

The key elements of the Grid Customer Specification and Grid Service Provider Specification are as follows.

Location: The Specification applies at the existing Bulk Supply Point at the Canungra Water Treatment Plant. An alternative Point may be agreed, if and when a new supply is developed or following a request from Queensland Urban Utilities (QUU).

Capacity: The Specification is the supply of water at the Bulk Supply Point to the capacity listed below.

Capacity specification – Canungra (ML/day)

	2011	2016	2021	2026	2031
Average	0.20	0.35	0.51	0.66	0.77
MDMM	0.30	0.52	0.77	0.99	1.15

Quality: The Specification is the supply of water at the Bulk Supply Point in accordance with the *Australian Drinking Water Guidelines* (2004) plus the additional parameters and alternative values listed below.

Quality specification – Additional parameters and alternative values.

Performance criteria	ADWG (2010) guideline values	Alternative or additional specifications	Assessment basis[1]
Chlorate (mg/L)	Not specified	< 0.8	95th percentile RPM, tested at least fortnightly
Fluoride (mg/L)	< 1.5	0.7 to 0.9[2]	95th percentile RPM, tested at least fortnightly
Geosmin (ng/l)	"Acceptable to most"	< 10	Mean, tested at least monthly
MIB (ng/l)	"Acceptable to most"	< 10	Mean, tested at least monthly
pH	6.5 to 8.5	6.5 to 7.5	Mean, tested at least fortnightly
Total chlorine (mg/L) (free chlorine plants[3])	< 5	> 2[4]	95th percentile RPM, tested at least fortnightly
Total chlorine (mg Cl as Cl2/L) (monochloramine plants[3])	< 4.1	> 2[4]	95th percentile RPM, tested at least fortnightly
Total THMs (µg/L)	< 250	< 225	95th percentile RPM, tested at least fortnightly
Turbidity (NTU) (bulk supply from WTP)	Not specified	< 0.3	95th percentile RPM, tested at least fortnightly
Turbidity (NTU) (bulk supply from pipeline)	Not specified	< 1	95th percentile RPM, tested at least fortnightly

Notes:

1. RPM is 12 month rolling performance measure.
2. Equals requirement under the *Water Fluoridation Regulation (2008)*.
3. Chlorine is the preferred system for stand-alone supplies. The preferred system for connected supplies is subject to a separate detailed investigation.
4. Upper limit specified by ADWG must also be met.

Reliability: The Specification is the availability to supply water at the Bulk Supply Point so that:

- Supply will always exceed demand under normal operating conditions
- due to major bulk water incidents, supply to consumers may be interrupted over the entire suburb for less than 24 hours no more than once every 25 years, on average
- due to major bulk water incidents, supply to consumers may be interrupted over multiple suburbs for less than 48 hours no more than once every 100 years, on average.

It is anticipated that the reliability specification may be able to be refined through the options assessment process.

Security: The Specification is the availability to supply water at the Bulk Supply Point in accordance with the Levels of Service (LOS) objectives specified in the Regional Water Security Program. Relevant objectives are that:

- During normal operating mode, sufficient water will be available from the SEQ Water Grid to meet forecast demand, including average residential demand of up to 230 litres per person per day
- medium level restrictions will not occur more than once every 25 years, on average
- medium level restrictions need only achieve a targeted reduction in consumption of 15% below the total consumption in normal operations
- it is expected that medium level restrictions will last longer than six months, no more than once every 50 years on average.

Canungra: Grid Service Provider Specification

The key elements of the Specifications are summarised below, along with the risk criteria and process to demonstrate compliance.

Delivery location: As per Grid Customer Specification supply location.

Capacity: As per Grid Customer Specification.

Quality: As per Grid Customer Specification. Quality should also be managed in accordance with the other elements of the ADWG. This includes the identification of potential hazardous events and ensuring appropriate mitigating options are available.

Reliability: As per Grid Customer Specification. It is a requirement of this specification that a quantitative assessment of overall system reliability can be undertaken, using a Failure Modes, Effects and Criticality Assessment. The assessment should demonstrate how the reliability specification can be achieved through existing and, if required, proposed infrastructure.

Reliability should be achieved through the combined use of all available treated water storage, including existing and planned distribution assets. QUU is required to maintain sufficient treated water storage to manage shorter duration peaks, including daily variations. The system reliability assessment is to focus on infrequent and severe incidents. For infrequent and severe events, reliability should be assessed based on supplying forecast Average Day demands during the incident.

Water availability: The WGM holds a water entitlement for 150 ML/a with a further 150 ML/a available as Strategic Reserve. These entitlements are available for local treatment options.

For local treatment options, the WGM will also require additional storage services. These services are required so that the WGM can achieve LOS objectives. Preliminary assessments indicate that a 250 ML off-stream storage would be sufficient to maintain supply in all but the most extreme drought, where some supplementation by carting may be required. For the purposes of this assessment, restricted demand is as listed below.

Security Specification - Restricted demand (ML/day)

	2011	2016	2021	2026	2031
Canungra	0.17	0.29	0.44	0.56	0.65

The WGM will make a final decision on the use of its water entitlements over the 20 year planning horizon based on an economic assessment of renewing or augmenting related storage, treatment and transport assets; the value of the water resource; customer connection preferences; and the cost of alternative supplies.

1.0 Purpose

The SEQ Water Grid Manager (WGM) holds water entitlements, procures bulk water services and sells bulk water.

This paper is the specification for the water that the WGM expects to sell Queensland Urban Utilities (QUU) at Beaudesert and Canungra over the next 20 years (the **Grid Customer Specification**). The specification reflects contractual and regulatory obligations between the WGM and QUU, and information provided by QUU.

Because they are single sources of supply, the Customer Service Specification is equal to the bulk water services that the WGM expects to require at these locations (the **Grid Service Provider Specification**).

The WGM makes Grid Service Specifications based on the efficient and effective operations of the system as a whole, taking into account the capability of existing infrastructure.

The WGM seeks advice from Seqwater about its existing capability to meet these Specifications from existing infrastructure, now and into the future, without major capital improvements. The specification will provide the basis for the identification and assessment of alternative infrastructure options by all Grid Service Providers; if and when the Specifications exceed the capability of existing bulk water supply infrastructure (refer **Figure 1**).

The WGM will review these specifications annually, taking into account demands at that time and any changes to the capability of existing infrastructure. It will provide advice to Grid Service Providers about any changes. This process will determine when the preferred option is delivered.

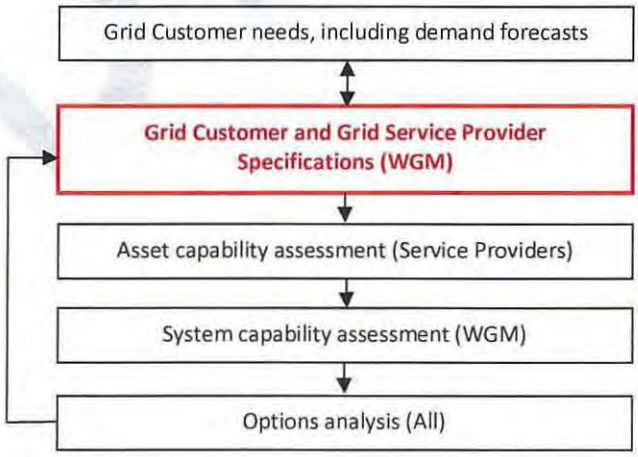


Figure 1: Specification, assessment and planning process.

2.0 Background

The Queensland Water Commission (QWC) has prepared a draft report titled *Framework for planning and delivery of water infrastructure in South East Queensland*. The report describes existing processes and instruments. More recently, the QWC has distributed an outline of proposed changes to the *South East Queensland System Operating Plan (SOP)* to clarify roles and responsibilities.

The QWC is facilitating a collaborative process to develop a plan for ensuring reliable water supply to the communities of Beaudesert and Canungra in the Scenic Rim local government area. The WGM understands that the purpose of the process is to:

- demonstrate the application of the existing planning and delivery framework
- identify the most prudent and efficient means of improving the existing supplies in order to meet forecast requirements over the next 20 to 30 years.

As part of this process, the WGM is responsible for the specification of what it expects to:

- sell to Grid Customers (Grid Customer Specifications)
- purchase from Grid Service Providers (Grid Service Provider Specifications).

The specifications are for supply to and from Bulk Supply Points, as defined under existing contracts.

For towns with a single source of supply, the Customer Service Specification and the Grid Service Specification will generally be the same. This includes Beaudesert and Canungra. In the connected Grid, the WGM will make Grid Service Specifications based on the efficient and effective operations of the system as a whole, taking into account the capability of existing infrastructure.

The Specifications are over a twenty year period for the elements listed in **Table 1**.

Table 1: Existing Bulk Supply Points

Grid Customer Specification	Grid Service Provider Specification (stand-alone supply)	Grid Service Provider Specification (connected Grid)
Location	Same	May vary
Capacity	Same	May vary
Quality	Same	May vary
Reliability	Same	May vary
Security	Water availability and storage services only	N/A

The Specifications are being developed consultatively, taking into account existing standards and forecasts. This includes:

- demand forecasts, as provided by QUU and Allconnex Water

- Customer Service Standards, as made by QUU in its draft Water Netserv Plan
- water entitlements and reliability, as held by the WGM
- existing Water Grid capability
- Level of Service objectives, as made by the Minister for Energy and Water Utilities in the Regional Water Security Program.

The Specifications draw upon previous planning studies and management plans for these supplies.

The Specifications are for the purpose of planning investigations. They may be varied through that process, including through the specification of alternative Bulk Supply Nodes.

As a second stage, the WGM will set Specifications for existing and proposed Bulk Supply Points in the Logan South area. The demands outlined in this document for this area are likely to be utilised for that purpose. While beyond the scope of the current collaborative planning process, future requirements in the Logan South area are relevant to the extent that they impact upon options that may be considered to meet the specifications for Beaudesert and Canungra.

3.0 Existing Bulk Supply Points

The specifications apply to the existing Bulk Supply Points, as described in **Table 2**. Additional or different Bulk Supply Points may need to be specified if and when major capital improvements are undertaken. The specifications will be revised prior to that occurring.

Table 2: Existing Bulk Supply Points

Distributor Service Provider	Asset (Grid Contract ID)	Detailed location and description of Bulk Supply Point	Demand Zone to which the Bulk Supply Point is related
QUU	Beaudesert (Helen St) WTP (BS-20)	On the treated water main 2 metres downstream of the isolation valve, located off the northern corner of TWPS	Helen Street Zone
QUU	Canungra WTP (BS-22)	First flange downstream of isolation valve number 3 located outside the NE corner of the control building, approximately 3 metres inside property boundary	Canungra Zone

Table 3 lists other Bulk Supply Points in the area that are not directly related to specification in this document but that may be relevant for planning purposes.

Table 3: Bulk Supply Points in surrounding areas

Distributor Service Provider	Asset (Grid Contract ID)	Detailed location and description of Bulk Supply Point	Demand Zone to which the Bulk Supply Point is related
Allconnex Water	South Maclean WTP (LCC-23)	South Maclean WTP outlet after Clearwater pump station	South Maclean Zone
Allconnex Water	SRWP Teviot Rd	Connection from SRWP to Logan at Teviot Road	LinkWater (Teviot Rd) Zone
QUU	Kooralbyn WTP (Outlet 1: Operational) (BS-23)	On the treated water main at the northern WTP fenceline (Wellington Bundock Drive) on the eastern side of the driveway	Kooralbyn Zone
QUU	Kooralbyn WTP (Outlet 2: Not operational. The WGM understands that this Point will be decommissioned at some time.)	On the treated water main at the northern WTP fenceline (Wellington Bundock Drive) on the eastern side of the driveway	Kooralbyn Zone
QUU	Rathdowney WTP (BS-24)	First flange downstream of isolation valve located near property boundary in second compound, north of chlorinator house	Rathdowney Zone

4.0 Forecast demand

For Beaudesert and Canungra, the Customer Service Specification is based on QUU demand forecasts. The WGM assessed these forecasts as being suitable for the purposes of making the Specifications. This assessment is summarised in **Attachment 1**, including an explanation of the forecasts considered.

Figure 2 illustrates the current reticulated areas and the location of the Bulk Supply Points.

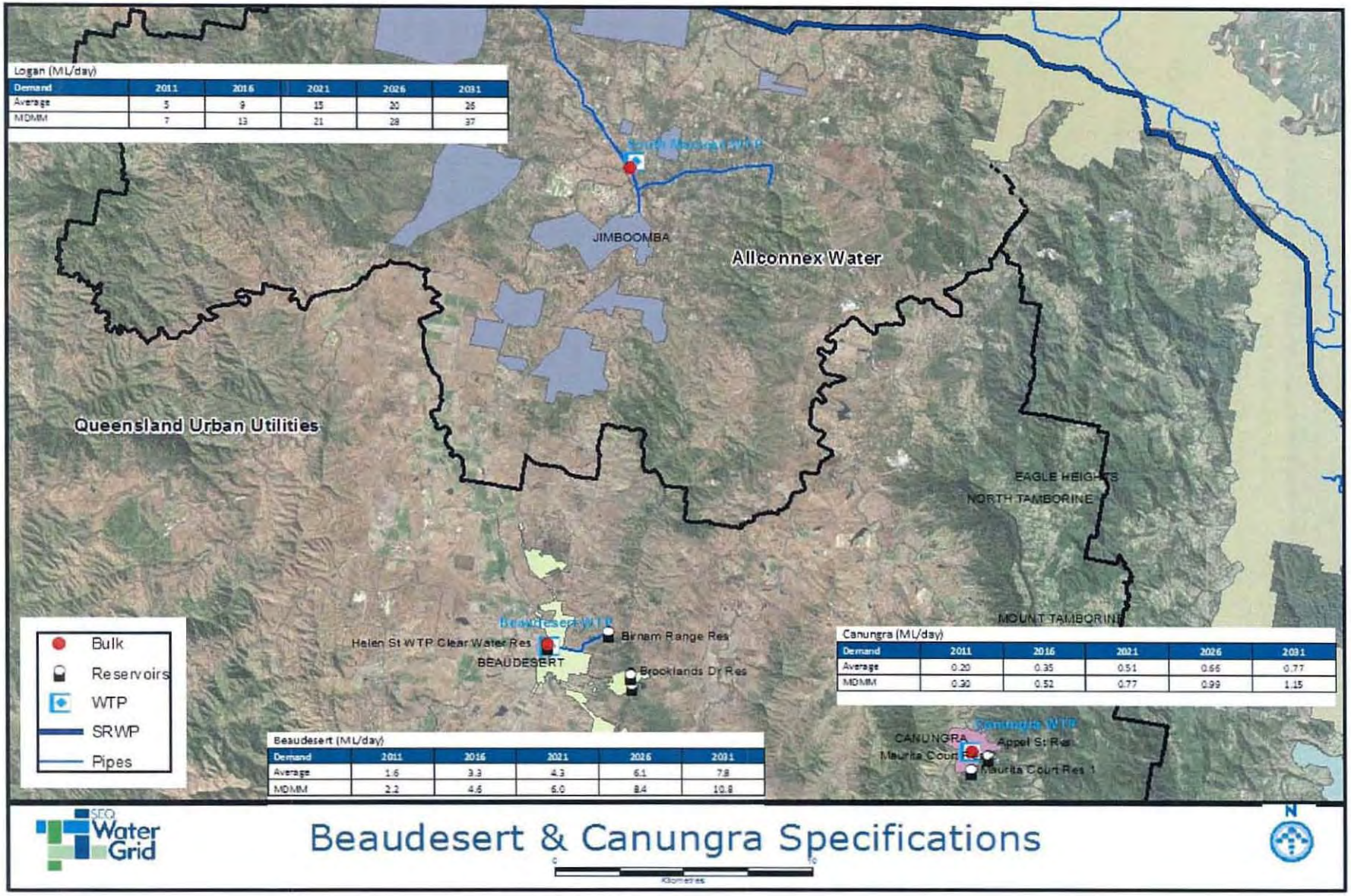


Figure 2: Current reticulated areas and location of Bulk Supply Points

4.1 Beaudesert

Table 4 lists forecast demand at the Beaudesert Bulk Supply Point. Supply capacity is specified for Average Day, Mean Day Maximum Month (MDMM) and Maximum Day (MD) demands. Average Day forecasts are provided for the purposes of security and operational cost assessments. MDMM and MD forecasts have been provided for the design of bulk water assets.

Table 4: Demand forecasts – Beaudesert (ML/day)

	2011	2016	2021	2026	2031
Average Day	1.6	3.3	4.3	6.1	7.8
MDMM	2.2	4.6	6.0	8.4	10.8
MD	3.4	6.9	9.0	12.8	16.4
Restricted demand	1.4	2.8	3.7	5.2	6.6

A MDMM peaking factor of 1.4 was applied for residential demands at the Bulk Supply Point. A peaking factor of 1.2 was applied for Bromelton industrial demands. Peak demands were assessed based on actual peaking factors calculated over periods from 2000 and the Department of Environment and Resource Management (DERM) Water Supply and Sewerage Guidelines. QUU may choose a different peaking factor for the purposes of designing its distribution network.

The forecasts include an allowance for development of the Bromelton industrial area. This provision is 50 Equivalent Persons (EP) in 2011, increasing to approximately 1870 EP in 2031. It is based on forecasts by QUU, utilising Council development forecasts in the January 2011 Priority Infrastructure Plan by Scenic Rim Regional Council.

The types of industries that are likely to develop in this area is not fully known. However, the Scenic Rim Regional Council has advised that it is not envisaged to be high water using industries. Rather, water use will be largely related to employee use. Two forecasts of potential employment were provided by QUU, which referenced work by Scenic Rim Regional Council. These were based on the *Scenic Rim Regional Council Priority Infrastructure Plan* (Jan 2011) and the *Scenic Rim Regional Council Structure Plan for Bromelton* (Sept 2010). Industrial demand will be reduced, should a recycled water scheme be developed.

No additional demand has been included for non-town water consumption, such as bulk water tankers for refilling rain water tanks, based on the assumption that in the early planning years there will be an ample supply available for this additional demand whereas latter in the planning years, if water is scarce, tankers can and should be redirected to where it is readily available.

Sensitivity

The demand forecasts are considered to be prudent planning assumptions, based on the information currently available. However, actual demand may continue to be less than these forecasts, both on average and during peak periods. Should that occur, then the improvements may be able to be deferred and delayed.

Lower demand forecasts have been developed for the purposes of sensitivity assessment, to assess the extent to which this may occur. These lower forecasts reflect that average consumption in rural towns tends to be less than in urban areas and that MDMM peaking factors have been relatively low compared to the DERM guideline values.

There is also a high degree of uncertainty regarding the timing and extent of growth in the Bromelton Industrial Area. Given this uncertainty, some sensitivity assessment has been undertaken on the effect of a high growth scenario in the Bromelton Industrial area on total demand in the Beaudesert area. This was based on the *Scenic Rim Regional Council Structure Plan for Bromelton* (Sept 2010).

In summary, the following demand forecasts for the sensitivity analysis are:

- For Beaudesert, average residential consumption of 180 l/p/day residential demand plus a MDMM peaking factor of 1.3 (**Table 5**). This compares to the base forecast of 230 l/p/day in 2016 and 1.4.

- For Bromelton, demand volumes are based on the number of employees forecast to work in the area contributing 0.2 of an EP (**Table 6**). This may occur with or without the forecast reduction in residential demand at Beaudesert.

- For Bromelton, demand volumes are based on the number of employees forecast to work in the area contributing 0.2 of an EP (**Table 7**). The number of employees was assumed to be those estimated in Scenic Rim Regional Council's Structural Plan (September 2010) as provided by QUU.

The following tables have been calculated on a pro-rata basis for preliminary discussion and review

Table 5: Sensitivity assessment – Beaudesert ongoing efficiency (ML/day)

	2011	2016	2021	2026	2031
Average Day	1.6	2.6	3.4	4.8	6.1
MDMM	2.2	3.3	4.4	6.1	7.8
Restricted demand	1.4	2.8	3.7	5.2	6.6

Table 6: Sensitivity assessment – Beaudesert reduced industrial development (ML/day)

	2011	2016	2021	2026	2031
Average Day	1.6	2.3	2.8	3.8	4.8
MDMM	2.2	3.0	3.7	4.9	6.2
Restricted demand	1.4	2.4	3.0	4.0	5.0

Table 7: Sensitivity assessment – Beaudesert increased industrial development (ML/day)

	2011	2016	2021	2026	2031
Average Day	1.7	5.5	7.6	9.9	12.0
MDMM	2.3	7.2	9.9	13.0	16.0
Restricted demand	1.4	4.7	6.5	8.4	10.2

4.2 Canungra

Table 8 lists forecast demand at the Canungra Bulk Supply Point.

Table 8: Demand forecasts – Canungra (ML/day)

	2011	2016	2021	2026	2031
Average Day	0.20	0.35	0.51	0.66	0.77
MDMM	0.30	0.52	0.77	0.99	1.15
MD	0.40	0.70	1.02	1.32	1.54
Restricted demand	0.17	0.30	0.43	0.56	0.65

A MDMM peaking factor of 1.5 was applied for residential demands at the Bulk Supply Point. QUU may choose a different peaking factor for the purposes of designing its distribution network.

Forecast demands exclude provision for supply to the Canungra Army Barracks. The Barracks has its own supply source. The probability of it needing to seek additional supply is uncertain, but potentially quite low based on historical performance. The WGM is unaware of any supply commitment to the Barracks from any of the Grid Participants. Some previous assessments have included an allowance of up to 0.25 ML/day.

No additional demand has been included for non-town water consumption, such as bulk water tankers for refilling rain water tanks, based on the assumption that in the early planning years there will be an ample supply available for this additional demand whereas latter in the planning years, if water is scarce, tankers can and should be redirected to where it is readily available.

Sensitivity

For Canungra, a sensitivity assessment has been undertaken based on average residential consumption of 180 l/p/day residential demand plus a MDMM peaking factor of 1.4 (refer **Table 9**). This compares to the base forecast of 230 l/p/day and 1.5.

The following tables have been calculated on a pro rata basis for preliminary discussion and review

Table 9: Sensitivity assessment – Canungra ongoing efficiency (ML/day)

	2011	2016	2021	2026	2031
Average Day	0.2	0.27	0.40	0.52	0.60
MDMM	0.3	0.38	0.56	0.72	0.84
Restricted demand	0.2	0.29	0.44	0.56	0.65

4.3 Review and refinement

Forecasts are based on the best available information. They will be refined over time based on actual trends. It is important to note that:

- There is currently a high level of uncertainty regarding the extent and timing of any rebound in demand. The WGM considers that this uncertainty will only be reduced following an extended period of hot and dry weather, which would result in increased outdoor irrigation.

- Average per capita demand in these towns is significantly different from the remainder of the QUU service area. These differences arise due to variations in non-residential consumption and the use of alternatively sources, such as rainwater tanks.

Planned infrastructure should only be delivered when needed. Real demand must be observed and assessed for how closely it tracks with forecasts. Triggers should be determined for the construction of new infrastructure, rather than building now for the ultimate growth scenario.

5.0 Specifications

The Grid Customer Specifications and Grid Service Provider Specifications are contained in Sections 5.1 to 5.5.

Service quality is likely to exceed these specifications over much of the time, due to the capability of existing infrastructure and growth in demand.

Where improvements are required, Grid options may be presented that are designed to deliver higher quality supply than is required under these Specifications at all times. Where that occurs, the reasons for targeting that higher quality supply must be explained and the associated costs quantified. This information will enable informed discussions between the WGM and Distribution Service Provider.

5.1 Location

The specifications apply to the existing Bulk Supply Points, as described in **Table 1**. Additional or different Bulk Supply Points may need to be specified if and when major capital improvements are undertaken. The specifications will be revised prior to that occurring.

5.2 Capacity

For Beaudesert, the capacity Specification is the capability to supply water at the Bulk Supply Point to the volumes specified in **Table 10**.

Table 10: Capacity specification – Beaudesert (ML/day)

	2011	2016	2021	2026	2031
Average Day	1.6	3.3	4.3	6.1	7.8

	2011	2016	2021	2026	2031
MDMM	2.2	4.6	6.0	8.4	10.8

For Canungra, the Specification is the capacity to supply of water at the Bulk Supply Point to the volumes specified in **Table 11**.

Table 11: Capacity specification – Canungra (ML/day)

	2011	2016	2021	2026	2031
Average Day	0.20	0.35	0.51	0.66	0.77
MDMM	0.30	0.52	0.77	0.99	1.15

QUU is generally required to maintain sufficient treated water storage to manage shorter duration peaks than MDMM, including daily variations. However, this requirement may be varied by agreement by the WGM and QUU on a temporary or permanent basis. This would be appropriate where it is demonstrated that an alternative specification would result in lower Net Present Value costs across the bulk and distribution systems. See **Attachment 3** for more information on how alternative supply solutions may impact the need for storage.

5.3 Quality

For Beaudesert and Canungra, the quality Specification is the supply of water at the Bulk Supply Point in accordance with the *Australian Drinking Water Guidelines* (2010) plus the additional parameters and alternative values specified in **Table 12**.

Table 12: Additional parameters and alternative values.

Performance criteria	ADWG (2010) guideline values	Alternative or additional specifications	Assessment basis[1]
Chlorate (mg/L)	Not specified	< 0.8	95th percentile RPM, tested at least fortnightly
Fluoride (mg/L)	< 1.5	0.7 to 0.9[2]	95th percentile RPM, tested at least fortnightly
Geosmin (ng/l)	"Acceptable to most"	< 10	Mean, tested at least monthly
MIB (ng/l)	"Acceptable to most"	< 10	Mean, tested at least monthly
pH	6.5 to 8.5	6.5 to 7.5	Mean, tested at least fortnightly
Total chlorine (mg/L) (free chlorine plants[3])	< 5	> 2[4]	95th percentile RPM, tested at least fortnightly
Total chlorine (mg Cl as Cl2/L) (monochloramine plants[3])	< 4.1	> 2[4]	95th percentile RPM, tested at least fortnightly
Total THMs (µg/L)	< 250	< 225	95th percentile RPM, tested at least fortnightly
Turbidity (NTU) (bulk supply from WTP)	Not specified	< 0.3	95th percentile RPM, tested at least fortnightly
Turbidity (NTU) (bulk supply from pipeline)	Not specified	< 1	95th percentile RPM, tested at least fortnightly

Notes:

1. RPM is 12 month rolling performance measure.
2. Equals requirement under the *Water Fluoridation Regulation (2008)*.
3. Chlorine is the preferred system for stand-alone supplies. The preferred system for connected supplies is subject to a separate detailed investigation.
4. Upper limit specified by ADWG must also be met.

These specifications generally reflect existing Grid Contract Documents, as explained in **Attachment 2**. The exceptions are that it has been assumed that existing Grid Contract Documents will be amended to:

- refer to the 2010 version of the ADWG
- reflect the assessment basis specified in that version of the ADWG, including by making clear parameters that should be measured on a rolling 95th percentile Rolling Performance Measure.

Additional parameters or alternative values have been specified where:

- the ADWG does not specify a value, such as for geosmin and MIB
- higher quality supply is required to enable the ADWG value to be achieved at the consumers tap, such as for total THMs
- an additional parameter is specified through other regulation, such as for fluoride.

These additional parameters or alternative values are explained in **Attachment 2**.

In particular, the alternative or additional parameters have been specified based on the QUU customer service standards. Those standards include:

- supply in accordance with the ADWG
- less than or equal to eight water quality complaints per 1000 properties per year
- less than or equal to ten water quality incidents per 1000 properties per year.

Quality should also be managed in accordance with the other elements of the ADWG. This includes the identification of potential hazardous events and ensuring appropriate mitigating options are available.

The risk of protozoa is likely to be a key consideration for WTP options. The WGM notes that there is a degree of uncertainty regarding the assessment of this risk, due to an absence of information and uncertainty regarding the most appropriate regulatory approach. For WTP options, the approach taken and assumptions made should be specified and explained. Should this risk be a key cost driver, it is preferred that the detailed raw water monitoring be undertaken before the treatment process is finalised.

Wherever possible, the delivery program should include provision for detailed raw water quality testing and assessment prior to finalisation of the treatment process.

5.4 Reliability

For Beaudesert and Canungra, the reliability Specification is the availability to supply water at the Bulk Supply Point so that:

- Supply will always exceed demand under normal operating conditions.

- Due to major bulk water incidents, supply to consumers may be interrupted over the entire suburb for less than 24 hours no more than once every 25 years, on average
- Due to major bulk water incidents, supply to consumers may be interrupted over multiple suburbs for less than 48 hours no more than once every 100 years, on average.

Supply may also be interrupted due to failures of the distribution system. In combination, the two systems should achieve the Customer Service Standards for continuity of supply as made by QUU. Those standards include that:

- There be less than or equal to 100 unplanned water interruptions per 1000 connections per year
- Supply be restored to normal service within five hours on 90% of occasions.

It is a requirement of this specification that a quantitative assessment of overall system reliability can be undertaken, using a Failure Modes, Effects and Criticality Assessment. An example of a fault tree analysis for assessing specification for water supply system reliability is provided in **Attachment 3**. The assessment should demonstrate how the reliability Specification can be achieved through existing and, if required, proposed infrastructure. All failure modes should be identified and probabilities of occurrence and duration for each mode are prepared, excluding drought (which is addressed separately in Section 5.5). Those failure modes should be considered for key assets, including raw water quality, power interruptions, asset failure and flooding.

Reliability could be improved through a combination of planned redundancy or planned response. Planned redundancy includes:

- power supplies
- asset redundancy
- additional storage
- high condition assets

Planned response includes:

- carting
- critical spares
- emergency curtailment.

Prior to any new options being explored the existing system should be assessed to define existing system capacity.

The WGM will develop a framework for the Failure Modes, Effects and Criticality Assessment for the overall system analysis at a key asset level. Entities may undertake risk assessment for their own internal purposes using whatever risk assessment methodology that they feel appropriate.

The WGM has also developed a system reliability model that will be used to assess and compare options against the reliability specification to a reservoir level. The model can assess multiple outputs at multiple levels of demand, including time to failure.

At this time, this is considered to be a flexible specification that provides a guide for options development and assessment. Options should generally seek to achieve this level of reliability at least overall cost, subject to other specifications. Alternative outcomes should be presented, where higher levels of reliability can be achieved at similar costs.

Reliability should be achieved through the combined use of all available treated water storage, including existing and planned distribution assets. As described in Section 5.1, QUU is required to maintain sufficient treated water storage to manage shorter duration peaks, including daily variations. Taking storage into account, the reliability assessment is likely to focus on incidents involving an interruption to bulk supply for 48 hours or longer. When assessing multiple supply options, the cost of supplying sufficient reticulation storage should also be considered.

For frequent failure events, the combined system should be planned to have sufficient capacity to meet demand without the need for curtailment or any interruptions to supply. This includes a reasonable allowance for peak demands. For planning purposes, it is recommended that reliability assessments for these frequent events be undertaken based on 85th, 95th or 100th percentile demands.

For infrequent events, reliability should be assessed based on supplying forecast Average Day demands during the incident (refer **Table 10** and **Table 11**). These forecasts are considered to include an appropriate allowance for outdoor irrigation during incidents, noting that may of those incidents are likely to be related to wet and extreme weather. Specifically, as explained in Section 4.0, these forecasts are based on average residential consumption of up to 230 l/p/day. This compares to average current consumption of about 160 l/p/day and average internal use of about 130 to 140 l/p/day. During an event, demand could be reduced to below these levels by public messaging and, when required and practical, curtailment.

Attachment 3 includes a discussion of the principles and justification for the proposed reliability specification. It is anticipated that the reliability specification may be able to be refined through the options assessment process.

5.5 Security

For Beaudesert and Canungra, the Specification is the availability to supply water at the Bulk Supply Point in accordance with the Levels of Service (LOS) objectives specified in the Regional Water Security Program. Relevant objectives are that:

- During normal operating mode, sufficient water will be available from the SEQ Water Grid to meet to meet forecast demand, including average residential demand of up to 230 litres per person per day.
- Medium level restrictions will not occur more than once every 25 years, on average

- Medium level restrictions need only achieve a targeted reduction in consumption of 15% below the total consumption in normal operations
- It is expected that medium level restrictions will last longer than six months, no more than once every 50 years on average.

The first of these objectives has been adapted for this purpose. The change is required because, in both towns, non-residential use is forecast to differ from the regional average.

Table 13 lists forecast restricted demand, based on these objectives and the demand forecasts described in Section 4.2. The forecasts are for medium level restrictions, which may occur once every 25 years on average with an expected duration of six months. At all other times, the supply at the Bulk Supply Points must be capable of achieving forecast unrestricted demand.

Table 13: Restricted demands – 85% of Average Day demands (ML/day).

	2011	2016	2021	2026	2031
Beaudesert	1.4	2.8	3.7	5.2	6.6
Canungra	0.17	0.29	0.44	0.56	0.65

6.0 Water availability

6.1 Beaudesert

The WGM could use a number of its water entitlements for supply to Beaudesert from a local WTP. These are:

- allocations totalling 3,165 ML/a in the Resource Operations Plan zone adjacent to Beaudesert
- an additional 5,215 ML/a in an adjacent zone that could be transferred into the zone relevant to Beaudesert, subject to the trading envelopes specified in the Resource Operations Plan
- 10,000 ML/a that is currently available as Strategic Reserve
- in excess of 20,000 ML/a soon to be available from Wyaralong Dam.

These entitlements exceed forecast average demand. For comparison, as stated in Section 4.1, that demand is forecast to increase from 1.6 ML/day (about 580 ML/a) in 2011 to about 7.8 ML/day (about 2,850 ML/a) in the year 2031. With increased industrial development, it may reach as high as 12 ML/day (about 4,800 ML/a).

However, physical water availability during times of drought is a significant issue that may impinge on the ability to access all of the volume authorised via the relevant water entitlement. Preliminary assessments indicate that:

- entitlements are sufficient to achieve the LOS objectives over the short- to medium-term

- by the year 2031, the frequency of restrictions may exceed the LOS objective of once in every 25 years on average.

The WGM is assessing water security at a range of demand levels and for a range of supply options, including transfers of entitlements, direct access to the Bromelton Off-Stream Storage and supply of recycled water.

This assessment is generally consistent with the SEQ Water Strategy, which states that:

"...the construction of the Bromelton Off-stream Storage and Cedar Grove Weir has allowed the WGM to reduce the demand on Maroon Dam, increasing supply reliability to the communities of Beaudesert, Kooralbyn and, to a lesser extent, Rathdowney. These communities rely on high priority water allocations from the Logan River Water Supply Scheme and have previously experienced restrictions once every 10 years, on average. With the new supplies, hydrologic modelling indicates that it should be possible to reduce the frequency of restrictions to less than once every 15 years, on average. In the short to medium term, it could even be possible to achieve the LOS objectives."

6.2 Canungra

For Canungra, the WGM holds a water entitlement for 150 ML/a with a further 150 ML/a available as Strategic Reserve.

These entitlements exceed forecast average demand in the year 2031. As stated in Section 4.2, that demand is forecast to increase from about 0.2 ML/day (about 80 ML/a) in 2011 to about 0.77 ML/day (about 280 ML/a) in the year 2031. With ongoing water efficiency, demand in the year 2031 may reduce to about 0.66 ML/day (about 240 ML/a).

However, physical water availability during times of drought is a significant issue that may impinge on the ability to access all of the volume authorised via the relevant water entitlement. In late 2009, carting was trialled and other measures taken in response to low flows in the creek. Previously, restrictions have needed to be implemented to maintain supplies.

Options should seek to comply with the LOS objectives at least cost, subject to other specifications. This may be achieved through one or more of:

- in-stream works
- off-stream storage
- pipeline connection to another source
- delivery of any of the above as a drought response
- carting.

The WGM will assess compliance with the adapted security objectives, including of the frequency of implementing each element of the drought response plan (for example, the frequency and duration of carting). Where possible, this assessment will be undertaken using the Wathnet model provided by the QWC under licence. For options that are not

connected to the remainder of the Water Grid, security will be assessed on a scenario assessment basis.

Preliminary assessment indicates that a 250 ML off-stream storage would be sufficient to ensure that LOS objectives can be achieved at the forecast demand in all but the most extreme drought, where some supplementation by carting may be required. A final decision will be informed by advice by the Grid Service Provider about costs and feasibility.

7.0 Review and refinement

The specifications contained in this report are draft only, based on information available to the WGM at this time. These specifications should be refined through the planning exercise based on:

- feedback from relevant Grid Participants
- more detailed information about the basis for QUU demand forecasts
- if improvements are required, the outcomes of the options assessment.

The specification will be finalised as part of the planning process. From that time, it will be periodically reviewed based on actual demand trends and other considerations, including any changes to water quality requirements. Such changes may impact upon the scope of the preferred solution or the time at which it is delivered.

Attachment 1: Forecast demand

Demand forecasts are summarised in Section 4.0. This attachment explains the basis for the forecasts used. It includes:

- a review of population forecasts
- an assessment of existing demand forecasts for the purposes of specifying requirements for supply to Beaudesert and Canungra and assessing options against those requirements
- forecast demand in adjoining areas, where relevant for the purposes of options assessment
- an explanation of peaking factors applied and the assumed duration of those peak demand events.

The following principles were used in the review of the available forecasts:

- Use Distribution Service Provider forecasts of the timing and location of development in their areas of responsibility, where fit for purpose.
- Use Distribution Service Provider forecasts, where fit for purpose.
- Use existing forecasts, where fit for purpose.

Population forecasts

Queensland Urban Utilities (QUU) released a draft NetServ Plan for consultation in June 2011. For this plan, QUU based population projections on the *SEQ Regional Plan 2031*.

Table 1 lists the forecasts used for the Scenic Rim Regional Council (SRRC) area. Only urban footprint population increases were considered. Rural areas that are unconnected to services now were assumed to remain unconnected into the future. Non-residential growth was estimated from potential land set aside in council land use planning schemes.

Table 1: QUU population forecasts – SRRC.

Year	Forecast population
2010	38,304
2011	39,300
2016	45,936
2021	53,368
2026	61,720
2036	71,000

Table 2 contains the low, medium and high series forecasts for the total SRRC area, as published by the PIFU. The medium series forecasts are effectively the same as the forecasts used by QUU.

Table 2: PIFU low, medium and high series population forecasts – SRRC.

Year	Low series	Medium series	High series
2011	38,413	39,645	41,911
2016	43,681	46,195	51,530
2021	49,600	53,540	64,592
2026	55,637	61,806	79,676
2036	61,958	71,042	97,838

In 2010, Council prepared a paper that forecast population growth in individual towns and localities. That paper was titled *Population and residential development projections for the Scenic Rim Regional Council Local Government Area*[1]. **Table 3** contains the medium series forecasts for Beaudesert and Canungra.

Table 3: SRRC population forecasts – Beaudesert and Canungra.

Year	Beaudesert	Canungra	Total SRRC area
2011	6,238	910	38,306
2016	10,738	1,410	46,303
2021	17,738	2,010	57,130
2026	25,738	2,610	68,932
2036	33,738	3,010	80,442

The total projected population for the SRRC area is generally between the medium and high series PIFU forecasts in **Table 2**. For example, SRRC has forecast a total population in 2031 of 80,442. This compares to the PIFU medium series forecast of 71,042 and high series forecast of 97,838.

Overall, the total population used for SRRC area by QUU seems reasonable when compared to the SRRC projection. As a principle it is preferred that numbers based on Regional Planning instruments be used in areas flagged for significant growth. However, there is insufficient information available to determine how QUU has disaggregated the PIFU population data to the locality level.

Review of existing demand forecasts

The following tables and graphs summarise the existing demand forecast volumes considered in this review. The basis for these forecasts is described below.

Table 4: Beaudesert – Forecast average day demands (ML/day).

	2011	2016	2021	2026	2031
WGM	**1.64**	**2.04**	**2.57**	**3.22**	**3.90**
QUU: Residential	1.59	3.11	4.05	5.66	7.25
QUU: Bromelton industrial estate	0.01	0.17	0.28	0.40	0.52
QUU total	**1.6**	**3.28**	**4.33**	**6.06**	**7.77**
QUU total: High Demand Bromelton	**1.7**	**5.50**	**7.60**	**9.90**	**12.20**

[1] SRRC, May 2009, *Population and Residential Development Projections for the Scenic Rim Regional Council Local Government Area*.

Table 5: Beaudesert – Forecast MDMM demands (ML/day).

	2011	2016	2021	2026	2031
WGM	2.46	3.07	3.85	4.83	5.84
WGM with 20% rebound	2.47	3.68	4.62	5.79	7.01
QUU[1]	2.39	4.86	6.42	8.97	11.5
QWC MDMM	2.97	5.47	9.18	13.25	17.00
QUU total: High Demand Bromelton	**2.30**	**7.20**	**9.90**	**13.00**	**16.00**

[1] 1.5 factor applied to residential component and 1.2 MDMM factor applied to Bromelton Industrial Area component.

Figure 1a: Beaudesert – Forecast MDMM demands (ML/day).

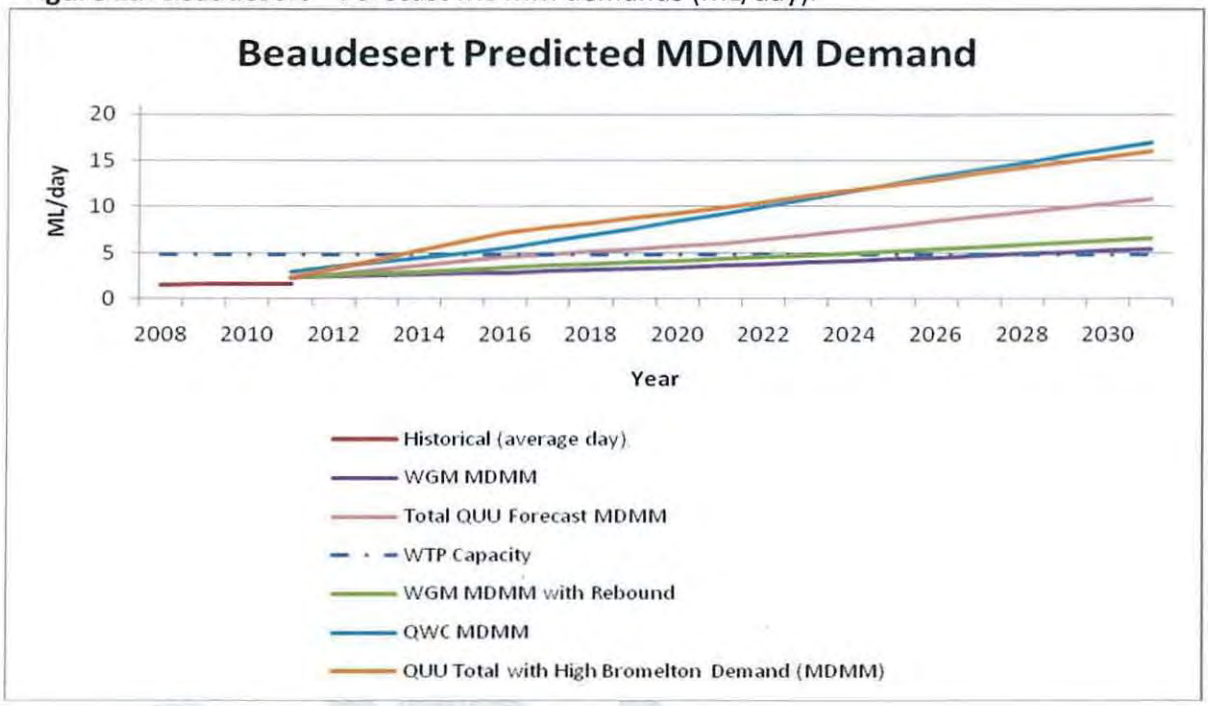


Figure 1b: Beaudesert – Forecast Average demands (ML/day).

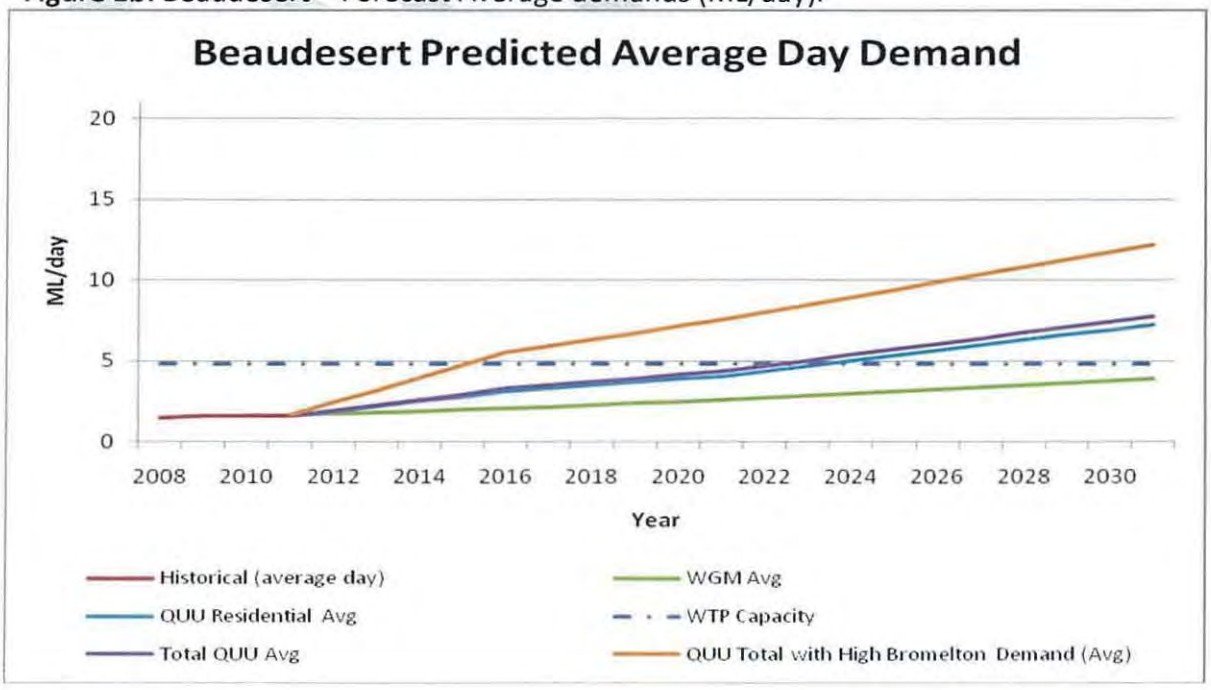


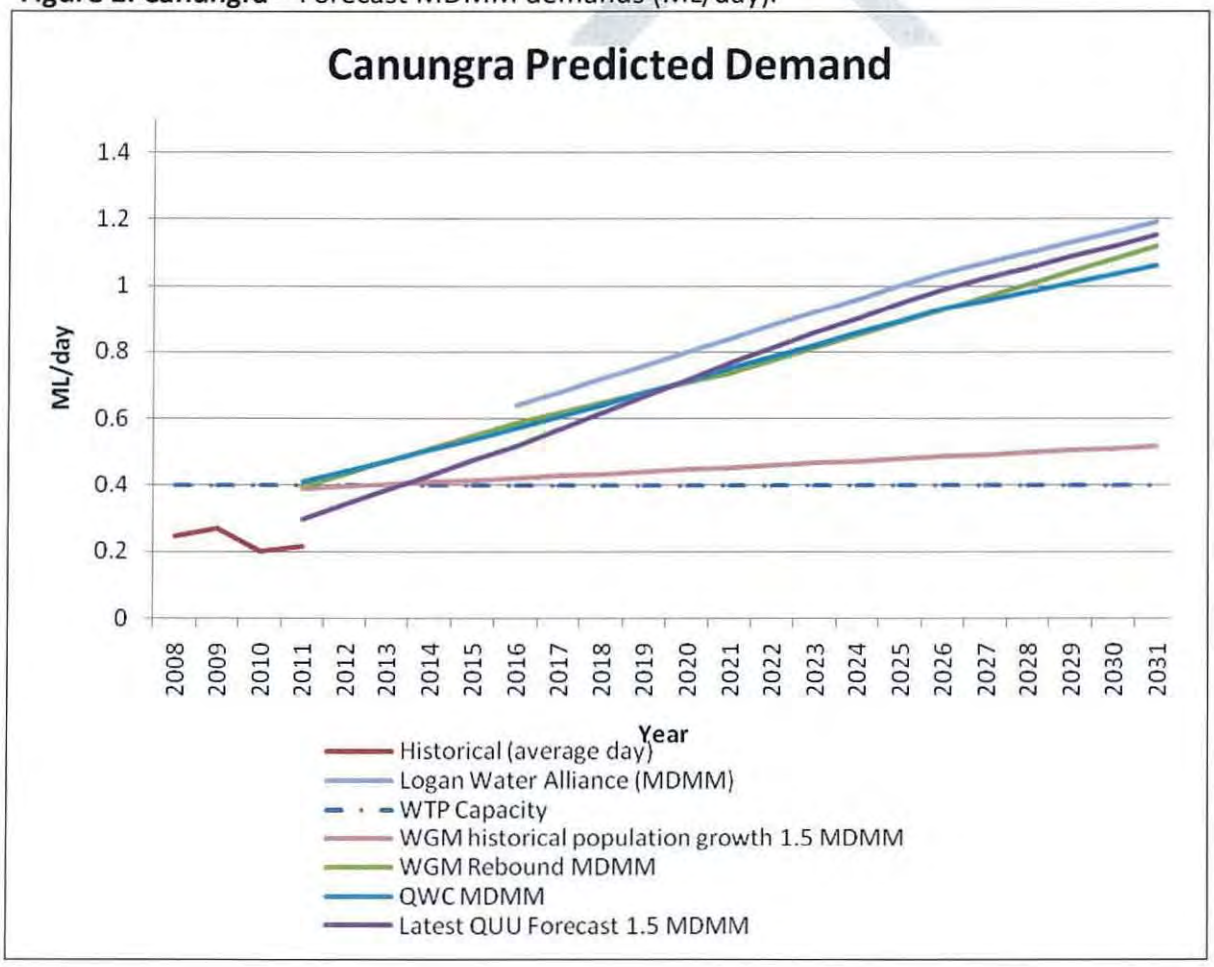
Table 6: Canungra – Forecast average day demands (kL/day).

	2011	2016	2021	2026	2031
WGM	262.9	326.9	410.1	514.6	622.6
QUU	197.3	346.4	512.4	659.9	768.4

Table 7: Canungra – Forecast MDMM demands (kL/day).

	2011	2016	2021	2026	2031
WGM	394.3	490.3	615.2	771.9	933.9
WGM with 20% rebound	473.1	588.3	738.2	926.2	1120.7
WGM with historical population growth and 1.5 peaking factor	390.0	422.2	454.4	486.6	518.8
QUU	296.0	519.6	768.6	989.8	1152.6
Logan Water Alliance		640.0	840.0	1040.0	1190.0

Figure 2: Canungra – Forecast MDMM demands (ML/day).



Queensland Water Commission (as part of Worley Parsons options paper)

Worley Parsons has prepared a report titled *Proposed water supply options to standalone communities in the Scenic Rim* for the Queensland Water Commission (QWC).

The report includes two forecasts for Beaudesert and Canungra. One of these forecasts is based on 375 L/EP/day, and the other generally based on 230 L/EP/day.

For the purpose of this review, the 375 L/EP/day forecasts were disregarded. The 375 L/p/day target proposed by the SEQ Water Strategy was intended to apply based on total population rather than EP. If applied to population rather than EP this would inherently allow for non residential use to be factored in proportion to the total population of an area. In addition, the 375 L/p/day was intended as a regional average which may not necessarily apply at a smaller area individually.

For Canungra, the forecasts based on 230 L/EP/d was used in this review. There was no specific allowance for non-residential use, which appears reasonable given the relatively low level of non-residential use in that area.

For Beaudesert, the forecast was developed in two components, being residential and non-residential. The residential component was developed using 230 L/EP/day and the non-residential was built up using 375 L/EP/day. This would appear to overestimate the non-residential component using the 375 L/EP/d applied directly to the non-residential component unless this is to make specific allowance for high water use industries that are known to be establishing in the Bromelton Industrial area.

The EP values are not specified and there appears to be some confusion as to whether per person or per EP approach was taken. It is also unclear on what basis the residential and non-residential components were developed.

QUU: Three year forecast provided to WGM

The Market Rules requires that Grid Customers provide a three year demand forecast to the WGM by end May each year.

Given the short timeframe, this forecast is of limited relevance to the specification. Limited detail is provided on the assumptions used to develop the "likely" forecast.

QUU: NetServ Plan

For its draft NetServ Plan, QUU assumed that residential consumption would rebound from current levels (150 to 160 L/p/d) to 230 L/p/d in 2016 and onwards. This is consistent with the QUU water and sewerage guideline planning assumptions. For comparison, current residential consumption in the Scenic Rim area is approximately 100 L/p/d to 120 L/p/d, according to the water dashboard website at www.water.qld.gov.au.

QUU has assumed that there will not be a rebound in non-residential unit demands. Industry will remain efficient and maintain WEMP type savings.

WGM: Regression analysis

The WGM has developed forecasts using a multiple factor linear regression analysis of metered water consumption for the period following the easing of restrictions for the various council areas across SEQ. Current behaviour is embedded in the analysis, both in the coefficients derived and in any skew to the fit of the regressions.

The demand forecasts presented in this paper is based on medium series population growth scenario from PIFU (2008) and average maximum temperature and rainfall, without an allowance for behavioural change.

The analysis includes a nominal allowance for rebound in demand. That allowance is based on the rebound that occurred on the Gold Coast City following the drought that occurred during 2003–04. The Gold Coast City demand was assessed in the report titled *Gold Coast City's Emergency Water Needs* published in 2006 by KBR. In that report an assessment of demand rebound is undertaken for residential and non-residential demands. It found that while non-residential demand did not rebound, there was a 21% increase in residential demand in the year following the drought.

The Gold Coast analysis indicates that a 20% demand rebound on residential demand may be possible in response to a return to hotter, drier conditions lasting over 12 months. This rebound in average day demand is in addition to appropriate demand peaks.

It is recommended that this nominal allowance for demand rebound be revised in 12 months or after an extended hot, dry period has passed.

Rebound was built in to the 2016 volume forecasts. That is, is assumed that the rebound will take effect over the time period between 2011 and 2016 (though not necessarily progressively over that period).

For Canungra, the majority of the water use is residential such that 20% increase in demand was factored in for total demand.

For Beaudesert, limited detail on the residential/non-residential split restricted the ability to apply a reasonable demand rebound factor at this stage. In absence of this information, 20% rebound was factored into the total demand, providing an upper limit of the extent of rebound in this area.

The WGM regression based forecasts were developed on the old council areas of Beaudesert Shire Council. These water demands were then disaggregated according to historic demand forecast data and usage data. As such, this disaggregation will underestimate the growth experienced in smaller areas that are growing at a greater rate than historically has been the case.

These forecasts are only used as a reference for checking against other forecast methodologies and are not recommended to be used for the detailed planning exercise currently being undertaken.

Logan Water Alliance

Demand forecasts are included in a report by the Logan Water Alliance titled *Logan South Strategic Water Supply Planning Study*. These forecasts are:

- those developed by Allconnex Water for the Logan South area
- those used for the Scenic Rim area, which are cited as being sourced from the QWC.

The forecasts developed by Allconnex Water for Logan South are not directly relevant to this specification, as they relate to the areas north of Beaudesert in the Allconnex Water areas of responsibility. However, they appear to have been developed using a robust methodology and it is suggested that they are taken as is for use in further options analysis.

The QWC forecasts for the Scenic Rim area are described separately above.

Recommended demand forecasts

Beaudesert

There was a reasonably high degree of variability in the forecasts used for this analysis. In particular, the QWC forecasts seemed to apply a relatively high end use factor to the demand at the Bromelton industrial area. In addition, the WGM regression analysis may not adequately account for the growth in the industrial area of Bromelton, and there is the potential that the disaggregation technique may underestimate demand forecasts for areas that are growing faster than the council area as a whole.

Considering these issues and the principles developed at the start of this paper, the QUU forecasts are deemed appropriate on which to base the options assessment being undertaken.

Sensitivity assessment needs to be undertaken for lower levels of demand rebound and slower rates of industrial development, as described in Section 4.1 of the Specification.

Canungra

All forecasts were reasonably close for much of the time period under consideration, with the exception of the forecasts used in the Logan Water Alliance report.

As such, it is considered that the forecast provided by QUU will suffice for the purpose of this specification.

Sensitivity assessment needs to be undertaken for lower levels of demand rebound, as described in Section 4.2 of the Specification.

Logan demand forecast

To undertake an assessment of supply options into the QUU service area, statements of the demands to be met in the Allconnex Water area need to be made.

The demand forecasts developed by the Logan Water Alliance for the Logan South Planning report are considered to be suitable for this purpose. These forecasts are summarised in **Table 8**.

Table 8: Logan demand forecasts

	2011	2016	2021	2026	2031
Average	5	9	15	20	26
MDMM	7	13	21	28	37

Note: Average day demands were not provided as part of the Logan Water Alliance Planning report and have been estimated in the table above by assuming an aggregate peaking factor of 1.4 is indicative of the component factors used to build these MDMM forecasts.

Table 9 lists assumed demand forecasts in the Gold Coast area for the purposes of assessing impacts on the overall water balance only. These assumptions were provided by LinkWater, based on its assessment of planning related demand forecast developed by Allconnex Water adjusted to align with current water use levels. Planning demand forecasts developed using an equivalent tenement approach have been downsized to 70% of the original forecasts to provide a reasonable demand forecasts on which to base the regional water balance. This factor of 70% was chosen after comparing current trends with the planning forecasts developed by Allconnex Water.

Table 9: Assumed Gold Coast demand forecasts (water balance assessment purposes only).

	2011	2016	2021	2026	2031
Average	180	198	214	228	241
MDMM	221	244	264	280	296

Peaking factors

This section explains the basis for the determination of an assumed peaking factor for Beaudesert and Canungra towns' demand forecasts. The assessment outlined below was undertaken as part of the Capability Assessment that was a component of the WGM's Annual Market Rules Review, as well as recent analysis of production data by LinkWater.

Guideline peaking factors

The Department of Environment and Natural Resource Management (DERM) *Planning Guidelines for Water Supply and Sewerage* (2010) contains a range of indicative demand peaking factors, as summarised in **Table 10**. The indicative factors give an indication of how traditionally peaking factors have been expected to increase as the period of the persistence factor reduces and the supply area population increases.

Table 10: Indicative Queensland peaking factors.

Equivalent Persons	MDMM/AD factor	Peak Day factor (PD/AD)
> 5,000	1.4 – 1.5	1.5 – 2.0
< 5,000	1.5 – 1.7	1.9 – 2.3
Arid areas (where internal water use is less than 30% of total water consumption)	1.5 – 1.7	1.7 – 2.0

Behavioural change since 2005 means that these guidelines have limited relevance in some parts of South East Queensland.

This information has informed the selection of an allowance for the peaking factor for Canungra and Beaudesert. The annual average demand was taken from the period six months ahead and six months behind the running 30 day demand to ensure that the peaking factors were not skewed over long data sets by demand growth influencing the average demand.

Pre-restrictions observed peaking factors (2000 to 2008)

For most of SEQ, this period largely pre-dated the introduction of High Level Restrictions and the Target 140 campaign, with the exception of perhaps the last year of data.

Mean Day Maximum Month (MDMM) peaking factors were calculated for Beaudesert and Canungra, where data was available, in accordance with the methodology stated in the *Planning Guidelines for Water Supply and Sewerage*. The rolling 30 day peak demand was divided by the annual average demand. The annual average demand was taken from the period six months ahead and six months behind the running 30 day demand to ensure that the peaking factors were not skewed over long data sets by demand growth influencing the average demand.

This information is used in the selection of an allowance for the peaking factor over and above the peaking factors observed in the post-drought period.

Post-restrictions observed peaking factors (2009 to 2010)

Mean Day Maximum Month peaking factors were also calculated for each region in accordance with the methodology stated in the guidelines over the period since 1 December 2009, when permanent water conservation measures were implemented.

Again, a rolling 30 day peak demand was divided by the annual average demand. The annual average demand was taken from the period six months ahead and six months behind the running 30 day demand to ensure that the peaking factors were not skewed over long data sets by demand growth influencing the average demand.

Latest production data

LinkWater has assessed the available production volumes from 1 July 2008 through until May 2011. These results are summarised in **Table 11**.

Table 11: Analysis of production data.

	Beaudesert		Canungra	
	ML/day	Ratio	ML/day	Ratio
Average Day	1.57	1	0.24	1
Maximum Day	3.3	2.11	0.46	1.95
Peak week	2.42	1.54	0.43	1.84
Four week peak	1.97	1.28	0.33	1.42

These production rates reflect the outcomes of a recent assessment of peaking factors in the Unitywater supply area. That assessment found that the upper envelope of Maximum Day peaking factors ranged from 2.92 to 2.05 for populations of less than about 5,300 equivalent persons, and remains roughly constant at about 2.05 for larger populations. The current Maximum Day peaking factors in Table 8 would therefore be expected to reduce as the Beaudesert and Canungra demand populations increase.

Selected peaking factors

Table 12 lists the results of the assessment undertaken for the Capability Assessment and the selected peaking factor for the purpose of this service specification.

Table 12: Selected MDMM peaking factors.

	Beaudesert: Residential component	Beaudesert: Non-residential component	Canungra
DERM Guideline Value	1.5	-	1.5
Observed peak (2000 to 2008)	1.44	-	1.44
Observed peak (from 2009)	1.21	-	1.36
Selected peaking factor	**1.4**	**1.2**	**1.5**

As illustrated by **Table 12**, the selected peaking factor is conservative, especially for Beaudesert. This is considered to be a prudent approach at this time. However, actual peak demand should continue to be reviewed and the peaking factor reduced if those peaks continue to be significantly below that recorded prior to the Millennium Drought. It is also recommended that sensitivity assessments be undertaken based on lower peaking factors, as described in Sections 4.1 and 4.2 of the Specification.

The selected Maximum Day peaking factor for the purposes of this Specification is 2.1 for both Beaudesert and Canungra.

Attachment 2: Water quality

The quality Specification is contained in Section 5.2. This attachment explains the:

- relationship between these specifications and the existing Grid Contracts
- basis for additional parameters and alternative values.

Grid Contract Documents

The specifications reflect existing contractual arrangements:

- For options involving supply from WTPs, the Grid Contract Document between the WGM and Seqwater provides that Seqwater must ensure that potable water supplied at nominated supply points that complies with the 2004 version of the ADWG. In addition, Seqwater must use its best endeavours to ensure that potable water supplied from particular WTPs meets specified additional quality parameters. These additional parameters reflect contractual requirements extant prior to 2005. For these options, it is intended that the additional parameters be included in Schedule 3 of the relevant Grid Contract Documents.

- For options involving supply by pipeline, the Grid Contract Document between the WGM and LinkWater provides that LinkWater must maintain the quality of the water so that it is of the same quality as when it was received, subject to naturally occurring or anticipated deterioration that cannot reasonably be prevented or mitigated using available facilities.

Where a party becomes aware that potable water does not, or will not, meet these requirements:

- the WGM may issue a direction about how that water is to be dealt with
- the Service Provider must use its best endeavours to ensure that further water meets the requirements, inform the WGM of the reason for the failure (or potential failure) and provide the WGM daily updates on the reasons for a continuing failure and the measures being undertaken to remedy it.

There are similar provisions in the Grid Contract Documents between the WGM and the Distribution Service Provider.

For the purposes of this specification, it has been assumed that existing Grid Contract Documents will be amended to:

- refer to the recently released version of the ADWG
- reflect the assessment basis specified in that version of the ADWG, including by making clear parameters that should be measured on a rolling 95th percentile Rolling Performance Measure.

For operational purposes, the SEQ Water Grid Quality Monitoring Plan will specify separate minimum quality indicators and communications triggers for key parameters. These levels will be agreed with the Distribution Service Provider through the existing process for that purpose. They include minimum disinfection residual, disinfection by-products and a range of aesthetic parameters, such as manganese.

Additional parameters and alternative values

For most parameters, the specification for water quality is compliance with the recently released *Australian Drinking Water Guidelines* (2010). The exceptions to this are explained below.

Turbidity

Turbidity is an important operational parameter in process control and can indicate problems with treatment processes, particularly coagulation/sedimentation and filtration.

The ADWG does not specify a guideline value for turbidity as an indicator for effective treatment. It does however include commentary stating that less than 1 NTU is desirable for effective disinfection.

An alternative specification has been made of less than 0.3 NTU (in combined filtrate) assessed on a 95th percentile 12-month rolling performance measure.

This limit can be considered standard industry practice, and has been devised with reference to the table below, sourced from Appendix A of the *Australian Guidelines for Water Recycling*.

Table 1: Comparison of turbidity specifications.

Document (listed by relevance to Australian drinking water supplies)	Guideline value for turbidity at point of treatment	Justification of limits chosen
1. NHMRC and NRMMC – Australian Drinking Water Guidelines	No guideline value. Commentary on "< 1 NTU desirable for effective disinfection"	An upper limit of 1 NTU is consistent with a 95th percentile of 0.3 NTU
2. World Health Organization – Guidelines for drinking water quality	No guideline value. Commentary stating "ideally ... median water turbidity below 0.1 NTU"	A median of 0.1 NTU is approximately consistent with a 95th percentile of 0.3 NTU
3. European Union – Council directive 98/83/EC of 3 November 1998 on the quality of water for human consumption	No guideline value. Commentary stating "should strive for a parametric value not exceeding 1.0 NTU in the water ex treatment works"	An upper limit of 1 NTU is approximately consistent with a 95th percentile of 0.3 NTU
4. New Zealand Ministry of Health – Drinking water standards in New Zealand	Various, corresponding type of treatment. Generally set limits of 95th percentile of 0.3 NTU, 99th percentile of 0.5 NTU, and upper limit of 1.0 NTU for three minutes	95th percentile limits are equal, other limits are approximately consistent, and demonstrate the consistency of documents 1 to 3 above
5. Health Canada – Guidelines for Canadian drinking water quality	Target of 0.1 NTU at all times, where not possible, the following apply to individual filters: • Chemically assisted filtration – 95th percentile of 0.3 NTU; upper limit of	"Target" of 0.1 NTU is approximately consistent with a 95th percentile of 0.3 NTU. Limits for chemically assisted filtration also consistent

Document (listed by relevance to Australian drinking water supplies)	Guideline value for turbidity at point of treatment	Justification of limits chosen
	1.0 NTU • Slow sand or diatomaceous earth filtration – 95th percentile of 1.0 NTU upper limit of 3.0 NTU • Membrane filtration – 99th percentile of 0.1 NTU; upper limit of 0.3 NTU	
6. US EPA – Drinking water contaminants list	For conventional or direct filtration: • Upper limit of 1 NTU • 95th percentile of 0.3 NTU.	Consistent.
7. Office of Environmental Health Hazard Assessment	None stated for turbidity.	N/A.
8. US EPA – Drinking Water Standards and Health Advisories	Upper limit of 5 NTU.	Inconsistent but low on hierarchy.

As the US EPA's Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is not included in this hierarchy, it has therefore been deemed to be of minimal relevance to Australian drinking water supplies, and not considered. However, it is expected that any other limits based on the LT2EWSTR will be deduced following the completion of the stated comprehensive monitoring programs.

Total THMs

The ADWG guideline value for total THMs is less than 250 µg/L assessed on a 95th percentile 12-month rolling performance measure.

An alternative specification has been made based on total THMs increasing through the distribution network. The alternative specification is 225 µg/L assessed on the same basis. This standard reflects that the distribution systems at Beaudesert and Canungra are relatively small, and that average water age is relatively low. The standard may be refined based on analysis of the distribution system by QUU.

The standard for total THMs at the tap has not been varied. The ADWG recommends that future reviews of the guidelines consider the various THMs individually, as data are emerging that suggest the different THMs have different toxic effects. Data were not sufficient at the time of this review to justify individual assessments. It also states that in view of the safety factors used in the derivation of the guideline value, it is unlikely that short-term consumption of water containing significantly higher concentrations of total THMs would pose a health risk.

Total chlorine

The ADWG specifies maximum levels for chlorine, based on disinfectant type:

- chlorine has a guideline maximum of 5 mg/L assessed on a 95th percentile 12-month rolling performance measure
- monochloramine has a guideline maximum of 4.1 mg/L (mg Cl as Cl2/L) assessed on a 95th percentile 12-month rolling performance measure.

A minimum level for total chlorine has been specified, of 2 mg/L at the Bulk Supply Point.

The basis for setting this minimum figure is to help ensure an appropriate amount of secondary disinfectant is applied within the bulk network.

This standard reflects that the distribution systems at Beaudesert and Canungra are relatively small, and that average water age is relatively low. The standard may be refined taking into account:

- analysis of the distribution system by QUU
- chlorine contact time.

Chlorate

The ADWG does not specify a guideline for chlorate.

An additional specification has been made, of chlorate of 0.8 mg/L assessed on a 95th percentile 12-month rolling performance measure.

This specification has been included in anticipation of future regulations. Specifically, it is understood that this value will be specified for drinking water in a future amendment to the *Public Health Regulation 2005*. It is also the value that is being applied on an informal basis across the Water Grid, on advice from the Office of the Water Supply Regulator, Department of Environment and Resource Management.

Longer-term, it understood that the forthcoming edition of the ADWG will include a health guideline limit for chlorate. Water quality monitoring is currently being undertaken to inform the specification of this standard.

Geosmin and MIB

The ADWG describes geosmin and MIB as having a taste threshold of 10 ng/L. The specification is that this standard be achieved on average over a 12-monthly Rolling Performance Measure, with a minimum sampling frequency of monthly. It is recognised that the events are normally seasonal in nature and therefore a monthly sampling frequency should allow an appropriate measure of flexibility in meeting this limit.

Data provided by QUU indicates that there are usually few complaints when at concentration levels of 10 ng/L. Specifically, a recent MIB event expressed negligible increases in complaint levels, even as concentrations exceeded 25 ng/L in the reticulation network. Geosmin is understood to express a similar effect and therefore the same limit has been set.

The notification level under the Seqwater-LinkWater-QUU Operating Protocol is a single exceedance of 10 ng/L, which is consistent with a contract limit of an average of 10 ng/L.

Fluoride

The *Water Fluoridation Regulation (2008)* prescribes limits for fluoride. The additional specification reflects these limits.

The limits are fluoride of between 0.7 and 0.9 mg/L assessed on a 95th percentile 12-month rolling performance measure.

pH

The ADWG recommends a pH range of 6.5 to 8.5 for aesthetic purposes. Due to the efficacy of free-chlorine disinfection being decreased at a pH higher than around 7.5, a lower upper limit was chosen. A higher pH limit may be appropriate in chloraminated supplies (not relevant to these two WTPs).

The limits are pH 6.5 to 7.5 assessed on a 95th percentile 12-month rolling performance measure.

Other considerations

Water quality complaints will often arise from aesthetic issues, which are sometimes poorly described and collated, and not clearly addressed in the ADWG. The development of an appropriate mechanism (likely the Operating Protocols and Grid Monitoring Plan) is critical to appropriately capture and share this "verification" information to improve water quality management, and also in the future alignment of complaint levels with the appropriate response (through various mechanisms; Operating Protocols through to Emergency Response Plan depending upon the nature and degree of customer dissatisfaction). This will enable upstream entities, and the WGM, to be alerted of a significant increase in water quality complaints, and respond accordingly.

This customer complaint information would also inform operational decisions. For example, it may inform decisions on short-term time steps based on, for example, the concentration of geosmin and MIB (and/or number of complaints) that could trigger a Water Grid operational response. Over a longer time step, for example monthly or seasonally, the choice of raw water sources could be predetermined to avoid specific water quality issues and associated customer complaints. This information could also inform planning decisions such as upgrading or installing new infrastructure and the longer term operation of the Water Grid, so to help avoid water quality issues and associated complaints.

WGM will continue to issue Product Quality Notifications where appropriate to ensure that QUU is aware of material changes in water quality, not necessarily only when incidents occur or ADWG values are exceeded.

Attachment 3: System reliability

The proposed reliability specification is contained in Section 5.4. This attachment explains:

- existing treated water storage at Beaudesert and Canungra
- system reliability concepts.

Existing treated water storage

At Beaudesert, there is currently 10.5 ML of treated water storage (refer **Table 1**). This is equivalent to around 6.6 days storage at current average demands of 1.6 ML/day, excluding allowance for fire fighting or minimum operating levels.

At Canungra, there is currently about 1.26 ML of storage. This is equivalent to around 6.3 days storage at current average demands of 0.2 ML/day, excluding allowance for fire fighting or minimum operating levels.

Table 1: Existing treated water storage.

Supply	Beaudesert	Canungra
Bulk storage	0.5 ML	0.028 ML
Distribution storage	10.0 ML	1.230 ML
Total storage	10.5 ML	1.258 ML
Supply at current average demand	6.5 days	6.5 days

Note: Consideration should be given to the locations and availability of existing storages when undertaking risk assessments.

System reliability concepts

The concept of reliability in water supply infrastructure includes the extent of a loss of supply. The frequency, severity and duration of these interruptions vary.

Water systems can store treated water at bulk and distribution levels, unlike electricity. That storage is usually designed such that supply can be maintained through expected or frequent failure incidents without any impact on consumers. This reliability is important because it avoids public health risks.

The Specification focuses on demand, and particularly the acceptable level of risk of supply interruptions due to infrequent and severe failure incidents. It enables Grid Service Providers to focus on optimising to the specified level of risk at the specified level of demand.

Key system reliability concepts are described below. These include:

- demand persistence
- minimum storage requirements
- additional storage requirements to manage frequent incidents
- management of infrequent and severe incidents.

Demand persistence

Demand persistence in water supply is the measure of the longevity of greater than Average day Demands. A range of demand persistence values can be calculated from an analysis of a supply area's maximum consumption over a twelve month period. The 1 day demand persistence is the Maximum Day, the thirty day persistence is the MDMM and the 365 day demand persistence period is the Average Day. **Figure 1** is an example of a typical persistence curve.

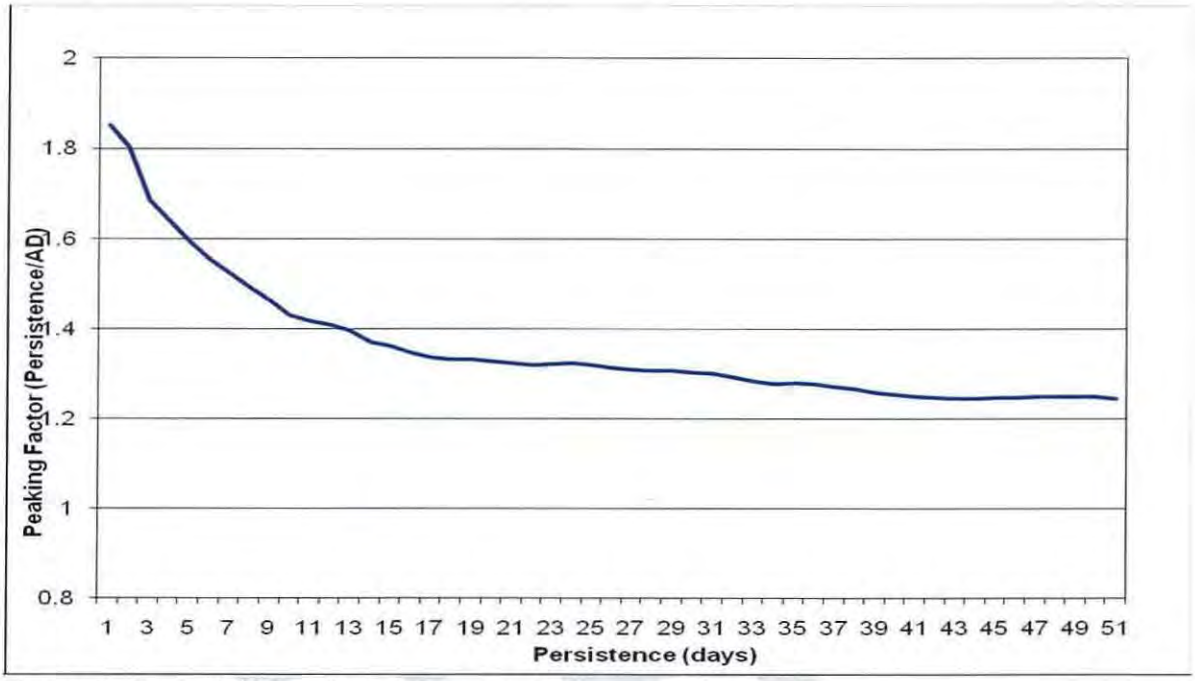


Figure 1: Typical demand persistence curve.

Persistence curve representation

It has been found that persistence curves for SEQ for persistence periods of less than 50 days can be reasonably approximated by the algorithm:

Peaking Factor = A x (Persistence Period ^ -B)

Where coefficient *A* equals the Maximum Day peaking factor and coefficient *B* is equal to:

Log_{10} *(MD Peaking Factor / MDMM Peaking Factor)* / Log_{10} *(30)*

Figures 2 and **3** show actual persistence curves for Canungra for years 2006–2010, and Beaudesert for 2009–2010, respectively. Also shown on these figures are the representative persistence curves generated using the above algorithms using maximum day values of 2.5 for both Canungra and Beaudesert, and MDMM values of 2.4 and 2.35, respectively, for Canungra and Beaudesert. These MDMM values are marginally higher than the recent history for these two towns to provide an allowance for demand rebound.

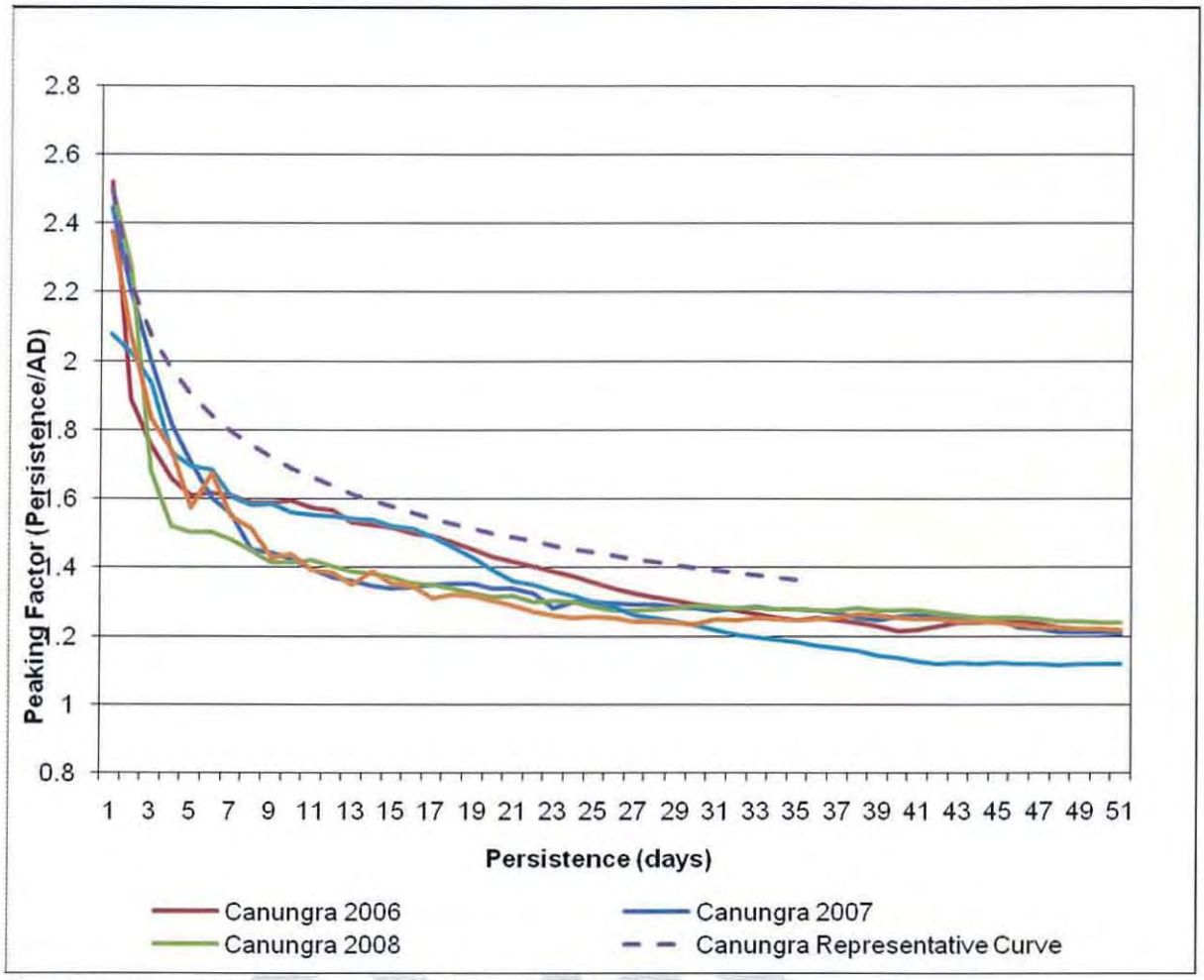


Figure 2: Canungra persistence curves 2006–2010.

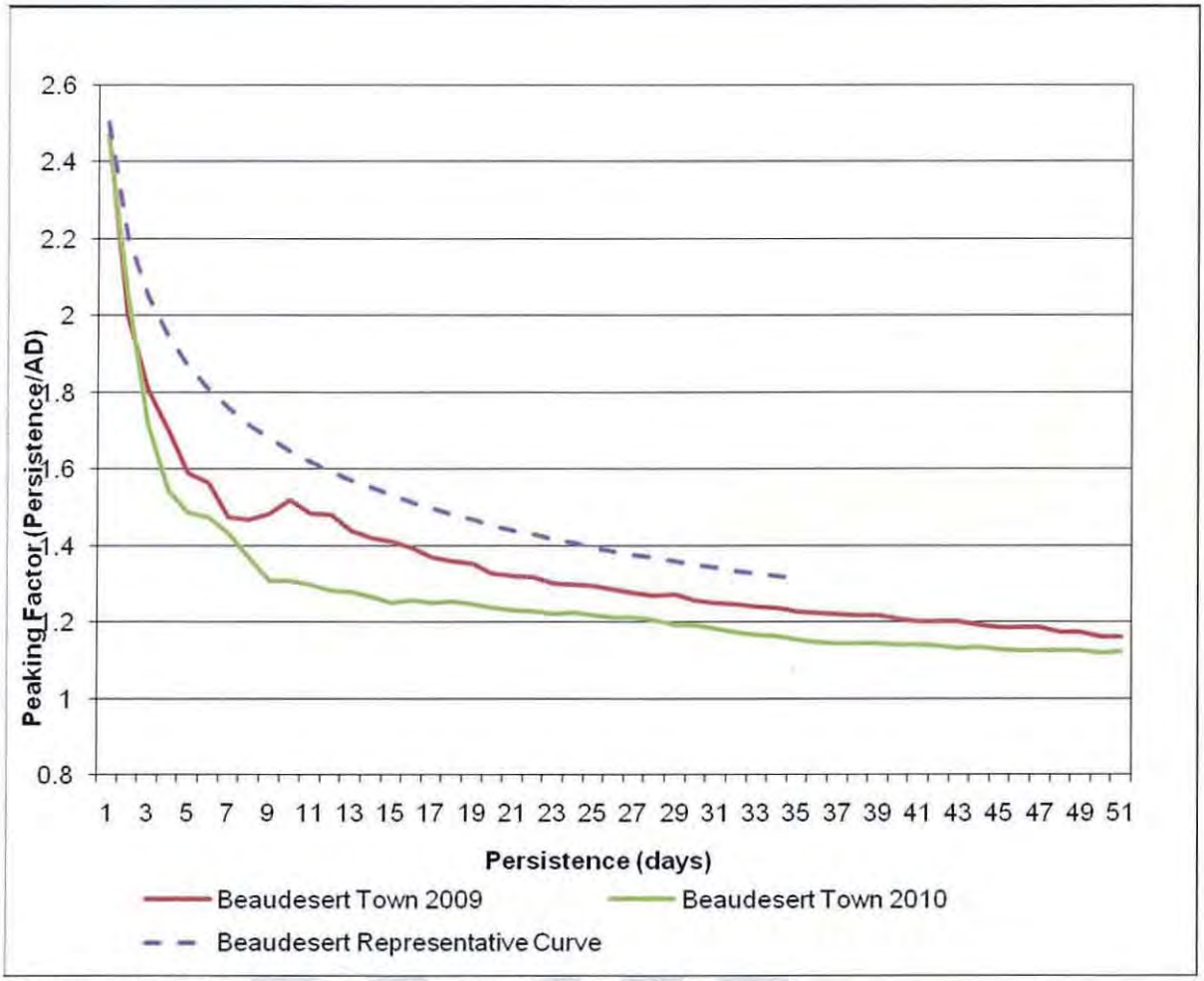


Figure 3: Beaudesert persistence curves 2006 –2010.

Probability of demand persistence curves

The above calculation is for the maximum demands for each persistence period. Based on the historical consumption data available, it represents a zero probability of demand exceedance. However, persistence curves can be readily adjusted to represent an infinite variety of probabilities of demand exceedance. **Figure 4** is a typical persistence curve with parallel 95th percentile and 80th percentile probability of demand curves and clearly shows a significant reduction in the short duration peaking factors. The 50th percentile probability of demand curve has not been plotted but is a straight line with a peaking factor of 1 for all persistence periods.

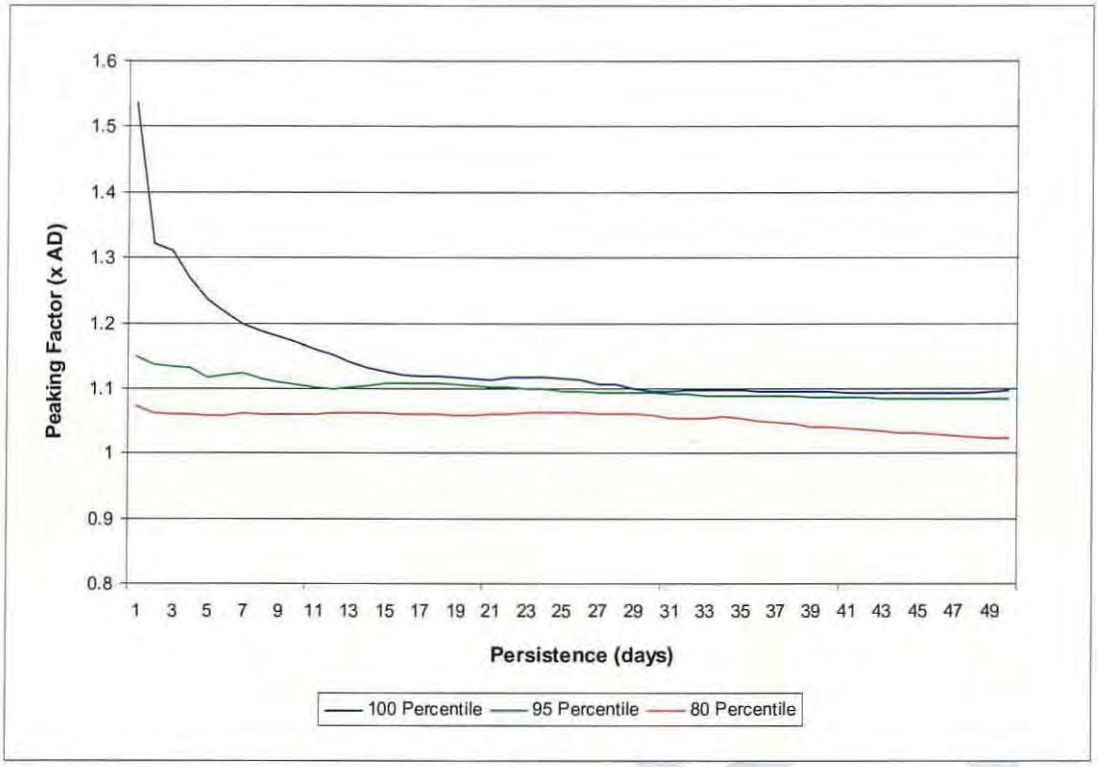


Figure 4: Typical persistence curves for varying probabilities of occurrence.

Minimum storage requirements

The system as a whole must be capable of meeting MD demands and peak demand events of longer duration. This demand can be met through a range of different infrastructure combinations, with differing amounts of supply and storage capacity. For example, a supply which is capable of supplying the instantaneous peak demand everywhere in its system would not need any reservoir storage, other than for emergency provisions. On the other hand, a supply system which has an infinite reservoir storage volume could function with a supply which is only capable of meeting the much smaller 365 day (AD) persistence period demand.

Generally, the system as a whole should comply with the relationship:

Minimum required storage = Maximum of (Persistence factor x AD demand – Inflow per day) x Persistence Period + Minimum operating storage

Minimum operating storage includes dead, diurnal, local pressure and fire-fighting storage requirements. The remaining component (that determined by maximising the persistence factor and persistence period) is known as the *Persistence storage*.

For Beaudesert and Canungra, the specification requires that the Water Grid be capable of providing an inflow equivalent to MDMM (refer Section 5.1). Below is an example of how the minimum required storage capacity can be calculated, excluding allowance for incidents (refer following sections).

Table 2 is a typical example showing how the persistence storage varies over a range of persistence periods from a typical persistence curve (in this example Peaking Factor = 2.45 x Persistence Period ^-0.1932) for an inflow equal to 1.5 x AD demand (traditionally the ratio adopted to determine the MDMM), and an AD demand equal to 20 ML/d. For this example, the maximum required persistence storage occurs for four days of demand persistence (shown in bold). This equates to maximum required storage of 29.9 ML, which is equal to 1.495 times the AD demand.

Table 2: Example persistence storage calculation.

Persistence period (days)	Persistence factor (multiple of AD)	Demand (Persistence factor x AD demand x Persistence period) (ML)	Inflow (Inflow x Persistence period) (ML)	Required persistence storage (ML)
1	2.45	49.0	30.0	19.0
2	2.14	85.7	60.0	25.7
3	1.98	118.9	90.0	28.9
4	**1.87**	**149.9**	**120.0**	**29.9**
5	1.80	179.5	150.0	29.5
6	1.73	208.0	180.0	28.0
7	1.68	235.5	210.0	25.5
8	1.64	262.3	240.0	22.3
9	1.60	288.5	270.0	18.5
10	1.57	314.0	300.0	14.0
11	1.54	339.1	330.0	9.1
12	1.52	363.8	360.0	3.8
13	1.49	388.1	390.0	-1.9
14	1.47	412.0	420.0	-8.0
15	1.45	435.6	450.0	-14.4
16	1.43	458.9	480.0	-21.1
17	1.42	481.9	510.0	-28.1
18	1.40	504.6	540.0	-35.4
19	1.39	527.1	570.0	-42.9
20	1.37	549.4	600.0	-50.6
21	1.36	571.4	630.0	-58.6
22	1.35	593.3	660.0	-66.7
23	1.34	614.9	690.0	-75.1
24	1.33	636.4	720.0	-83.6
25	1.32	657.7	750.0	-92.3
26	1.31	678.9	780.0	-101.1
27	1.30	699.9	810.0	-110.1
28	1.29	720.7	840.0	-119.3
29	1.28	741.4	870.0	-128.6
30	1.27	762.0	900.0	-138.0

Figure 5 illustrates the maximum persistence storage, plotted as a ratio to the AD demand, over a range of inflow ratios (between 1.0 and 2.6 times the AD). The figure also includes a plot of the associated persistence period for each maximum persistence storage data point.

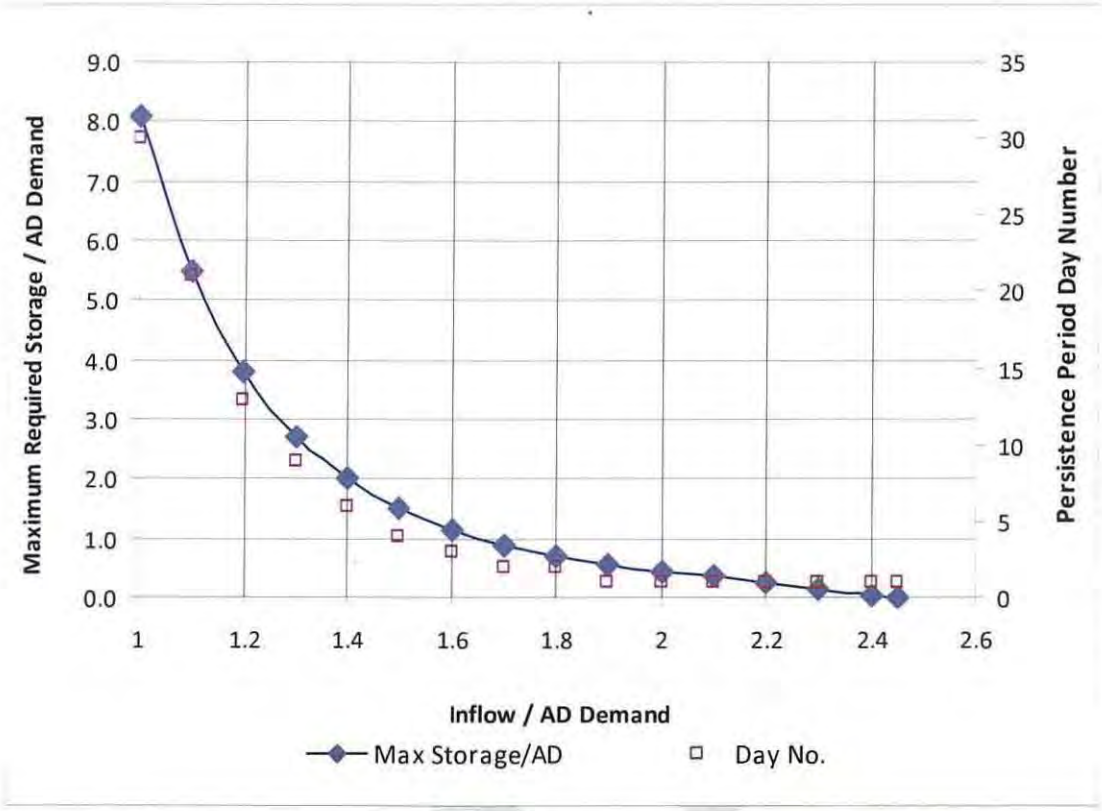


Figure 5: Example maximum persistence storage curve.

The total storage required using this methodology would equal the above persistence storage plus a daily fluctuation allowance (commonly 15% of the reservoir capacity, plus the reservoir dead storage plus an allowance for emergencies such as fire fighting or system failure.

Provision for likely incidents (more than once every three years, on average)

Supply to customers must also be maintained during incidents, when full capacity is not available. This may require additional capacity, over and above that required for managing peak demands.

During frequent failure events, the combined system should be planned to have sufficient capacity to meet demand without the need for curtailment or any interruptions to supply. This includes a reasonable allowance for peak demands. For planning purposes, it is recommended that reliability assessments for these frequent events be conservatively undertaken based on the 100th percentile demands.

Provision for infrequent incidents (less than once every three years, on average)

For less frequent incidents, there is a reduced probability of the failure event and a high demand period simultaneously occurring. Among other considerations, such incidents are often related to severe wet weather during which there is typically limited demand for outdoor irrigation.

This method of adopting a reduced water demand to coincide with an emergency event has been a long standing provision of the Queensland Department of Environment and

Resource Management (DERM) water supply design guidelines (*Planning Guidelines for Water Supply and Sewerage*). Those guidelines allow designers to assume (for residential areas) a reduced system water demand to coincide with a fire event. That allowance is taken from Appendix F of *AS2419.1 - Fire Hydrant Installations* which stipulates that the mains pressure required for fire fighting water main pressure is available 95% of the time. Two-thirds of the Maximum Hour demand is commonly nominated as an estimate of the 95th percentile in predominantly residential areas.

Persistence curves of varying probabilities of exceedance can be used to assess such combined probabilities using the algorithm:

Demand exceedance probability = 1 – (Acceptable probability of restriction implimenation) / (Probability of failure)

For example, adopting the specified 1 in 25 year requirement for the implementation of restrictions (to avoid running out of water) in conjunction with an assessed 1 in 10 year probability of an infrastructure item failure would equate to 1 – 0.04 / 0.1 = 0.6, i.e. a 60% demand exceedance probability using the above algorithm.

A Failure Modes, Effects and Criticality Assessment is required for these incidents, as outlined in Section 5.3. **Figure 6** provides an indication of the types of risks that needs to be considered as part of that assessment, pending finalisation of the WGM guidelines. It is expected that infrequently occurring incidents will be found to have demand exceedance probabilities less than 80%, and using **Figure 4** as a guide, to involve peaking factors of less than 1.1 – 1.2. As such it is suggested that these assessments be undertaken based on 1.2 times the Average Day demand.

It is likely that the solution will involve a combination of treatment or transport assets and storage assets. The additional storage capacity could be owned and operated by either a Grid Service provider or a Distribution Service Provider, depending upon local circumstances. **Table 3** provides an indication of the amount of storage capacity that may be required for different types of assets, varied by the level of system diversification.

Table 3: Reliability – Treated water storage requirements at average day demand.

Supply	Indicative storage required: Single source of supply	Indicative storage required: Fire fighting is less than emergency storage	Indicative storage required: Multiple sources available
WTP	4 days	5.5 days	3.5 days
Pumped pipe (pump duty standby with isolated separate switch boards)	2 days	3.5 days	2.5 days
Gravity pipe	0.5 day	2 days	2 days

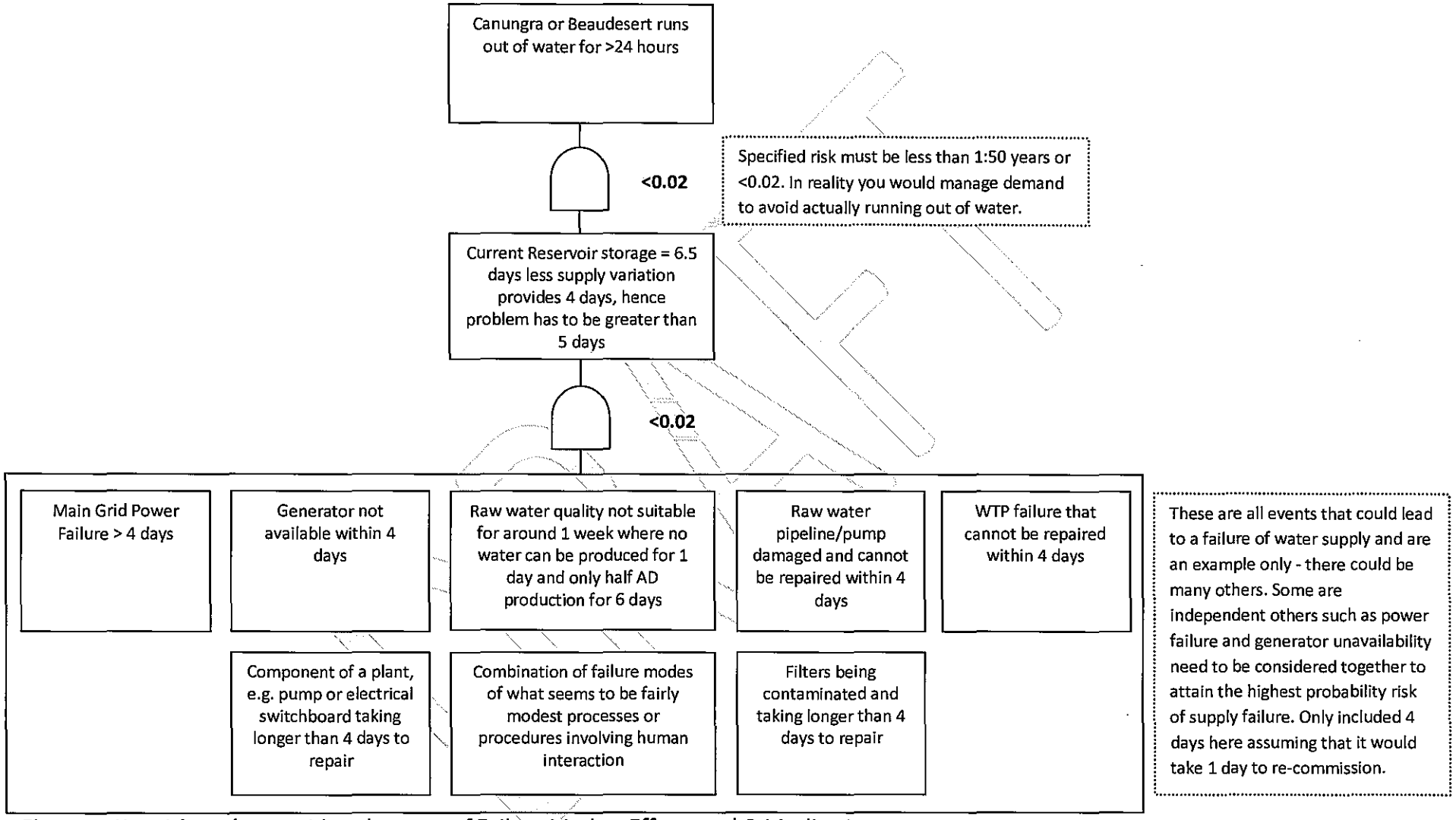


Figure 6: Key risks to be considered as part of Failure Modes, Effects and Criticality Assessment.

Relationship with water quality

Water quality is a key consideration in the optimisation of treated water storage requirements and the operation of those storages.

Water quality in a water distribution system, as compared to water quality leaving a water treatment plant, is commonly measured in terms of pathogen counts (where *E. Coli* is adopted as the surrogate pathogen) and disinfectant residual. Water age, organic content and temperature are the major factors affecting those measurements. Of these, water age is the only factor which can be mitigated by the operation the distribution system.

Water age is a function of through-flow and in-system storage volume of which reservoir storage is by far the largest component. Therefore, potentially, a reduction in the system's reservoir storage could make a large impact on its water age. However, as for the removal of redundant water treatment capacity, a reduction of in-system storage will also reduce the reliability of the system through a reduction of its capacity to cope with infrastructure failures.

Attachment 4: Security

The security Specification is contained in Section 5.5. **Table 1** describes the relevance of existing Levels of Service (LOS) objectives.

In the future, alternative standards may be able to be agreed with local communities and reflected in the price of bulk water supplies to that community. In some cases, it may be more efficient to reduce the cost of bulk water than to augment the existing infrastructure to meet these adapted objectives.

Table 1: Relevant LOS objectives for towns with stand-alone supplies.

LOS objective	Key objectives for towns with stand-alone supplies	Comments
During normal operating mode, sufficient water will be available from the SEQ Water grid to meet an average regional urban demand of 375 l/p/day (including residential, non-residential and system losses)	During normal operations sufficient water will be available to meet forecast demand, including residential demand of up to 230 litres per person per day	The reference to sufficient water being available to meet an average total urban demand of 375 litres per person per day (l/p/day) has been removed. Average total consumption in small towns may be significantly higher or lower than this, due primarily to differing levels of non-residential demand. The amended objective seeks to ensure that local supplies are sufficient to meet those demands, whatever that be. This is consistent with the intent of the original LOS objective, as explained in the SEQ Water Strategy.
Medium Level Restrictions will not occur more than once every 25 years, on average	Medium Level Restrictions will not occur more than once every 25 years, on average	No change
Medium Level Restrictions need only achieve a targeted reduction in consumption of 15% below the total consumption in normal operations	Medium level restrictions need only achieve a targeted reduction in consumption of 15% below the total consumption in normal operations	No change
Drought response infrastructure will not be required to be built more than once every 100 years, on average	-	This LOS objective relates to the construction phase of the regional drought response, as described in Section 3.1.2 of the SEQ Water Strategy. Such construction commences when storages fall to the T2 trigger, which is currently defined as 40% of the combined capacity of key Water Grid storages.

LOS objective	Key objectives for towns with stand-alone supplies	Comments
		This LOS objective is not relevant to towns with stand-alone supplies, which may experience droughts at other times to the connected Water Grid. For these towns, the preferred drought response may or may not involve construction of additional infrastructure. Where it does, the frequency at which that construction should be triggered should be assessed on a case specific basis taking into account such factors as whether that infrastructure will be required due to demand over the foreseeable future.
Combined regional storage reserves do not decline to 10% of capacity more than once every 1000 years, on average	-	This objective has been removed as it is irrelevant to towns with stand-alone sources of supply. An alternative objective may be specified for each town, based on the frequency of its local supply depleting to a specified level. This will depend upon the drought response plan for that town.
Regional water storages do not reach 5% of combined storage capacity	-	This objective has been removed as it is irrelevant to towns with stand-alone sources of supply.
Wivenhoe, Hinze and Baroon Pocket dams do not reach minimum operating levels	-	This objective has been removed as it is irrelevant to towns with stand-alone sources of supply.
It is expected that medium level restrictions will last longer than six months, no more than once every 50 years on average	It is expected that medium level restrictions will last longer than six months, no more than once every 50 years on average	No change

Attachment 7: Letter to Seqwater regarding Capalaba Water Treatment Plant

SEQ Water Grid manager

Secure and efficient water through partnership and innovation

TRIM ref: D/11/8973

23 December 2011

Mr Peter Borrows
Chief Executive Officer
Seqwater
PO Box 16146
City East QLD 4002

Dear Mr Borrows

We are writing to you regarding the management of total Trihalomethane (THMs) levels supplied to the Redlands area

As you are aware, in early 2009, a working group was formed to investigate THM issues in the Redlands area.

Further, this working group undertook an assessment of the range of THMs and haloacetic acids at the Capalaba Water Treatment Plant, the Alexandra Hills Reservoir Complex and the Alexandra Hills High and Low level zones. A copy of the executive summary from this review is attached.

The Grid Contract requires the supply of potable water to comply with the *Australian Drinking Water Guidelines 2011* (ADWG), at the Bulk Supply Points. The ADWG health-related guideline value for THMs is 250 micrograms per litre (µg/L). THM levels typically vary between 80–170 µg/L at the Capalaba Water Treatment Plant.

From the assessment it was noted that:

- After wet weather events in the catchment, THM levels can increase to over 250 µg/L in Allconnex Water's distribution system.
- Historically THMs in the Alexandra Hills Reservoir have been higher than THM levels at the water treatment plant, but recent operational improvements have minimised this.
- There can be a 20–35% increase in THM levels in part of Allconnex Water's distribution system that is supplied directly from Capalaba Water Treatment Plant if a target 95th percentile THM value of 250 µg/L was to be achieved at all points in Allconnex Water's distribution system, a THM target at Capalaba Water Treatment Plant would be 185 µg/L.

PO Box 16205, City East QLD 4002 Tel: +61 7 3247 3012 Fax: +61 7 3405 0373 www.seqwgm.com.au
ABN: 14 783 317 630

Consistent with the assessment, we would appreciate Seqwater's operation of Capalaba Water Treatment Plant in accordance with the following to further mitigate the occurrence of elevated THMs in the Redlands area:

1. **Quantity** - Minimise production from Capalaba Water Treatment Plant and maximise production from North Stradbroke Island at 30ML/day. We would like Capalaba Water Treatment Plant to be capable of supplying 7–14 ML/day Average Day Demand and 14–30ML/day Mean Day Maximum Month by 2016.

2. **Quality** - Limit THM levels at Capalaba Water Treatment Plant to less than 185µg/L, 95% of the time. Seqwater is to also continue its catchment management processes to assist with improving raw water quality.

3. **Reliability** - Due to available storage in the area and ability to supply from other sources, we understand that this plant may cease operation for up to a week based on raw water triggers to minimise treated THM levels above 185µg/L. Communication with LinkWater and the SEQ Water Grid Manager is crucial before and during these periods to ensure continuation of supply. This would enable the water treatment plant to be turned off when raw water exceeds 40NTU for turbidity as recommended by Water Strategies. We would like this to be implemented immediately, however note that Seqwater may suggest an alternative raw water surrogate/indicator as discussed in the working group.

Recent discussions with Seqwater indicate that Capalaba Water Treatment Plant is currently capable of the above and we would like to work with Seqwater to achieve this.

To meet the above, we:

- note that Seqwater may need to review its draft Drinking Water Quality Management Plan, Hazard Analysis Critical Control Point and/or operation plan for Capalaba Water Treatment Plant
- expect that a THM communication trigger consistent with the above will be considered for the Operating Protocol with Allconnex Water.

Seqwater, LinkWater and Allconnex Water would also need to implement a co-ordinated THM monitoring program to enable all parties to assess whether these operational changes are effective in minimising THM's along the supply chain.

We note that a 20 year options study led by Seqwater is being undertaken in this area and the SEQ Water Grid Manager will participate fully in the process and will refine the above specifications if required. We would also like to work with Seqwater to fully investigate Water Strategies' other recommendations.

We would like to thank your staff for participating in the working group and working collaboratively with Water Strategies and other Grid Participants to identify solutions to this water quality issue. We are also writing to LinkWater and Allconnnex Water on this matter.

We would appreciate your confirmation of Seqwater's commitment to this initiative and would be happy to meet to discuss further if you require any clarification.

If you have any queries, please contact Mr Jim Fear, Senior Systems Engineer, on 3405 5000 or via email at jim.fear@seqwgm.com.au

Yours sincerely

[redacted]

Barry Dennien
Chief Executive Officer

Attachment 1: Water Strategies Executive Summary

water
STRATEGIES

EXECUTIVE SUMMARY

Elevated Trihalomethanes (THM's) and Haloacetic Acids (HAAs) have occurred albeit infrequently in the treated water delivered from the Capalaba Water Treatment Plant. The WGM has formed a Steering Committee to investigate the cause and identify possible remedial actions. Some of these actions have been implemented and some investigations are underway or about to be commenced to trial possible solutions. Further data is also to be obtained to build a better understanding of THM formation in the distribution system.

The purpose of this review is to collate and review all information and data that has been collected to date in regard to elevated THMs in the Redland Capalaba area and to prepare a report outlining what has been done and what needs to be done to develop a strategy for reduction of THMs in the distribution system.

THE CAPALABA WATER TREATMENT PLANT

The Capalaba Water Treatment Plant (WTP) sources water from the Leslie Harrison Dam. Water quality in the dam can deteriorate substantially during high rainfall events resulting in the raw water having high colour, turbidity and dissolved organic carbon. Elevated levels of colour, turbidity and DOC can persist for long periods of time. The treatment plant is a conventional treatment plant with clarifiers and filters. Whilst it is effective in removing considerable DOC during wet weather events the residual DOC is in the range 5.5 to 6.0 mg/L. Water is chlorinated prior to being pumped to the Alexandra Hills Reservoir Complex. The Capalaba water can also feed directly into the distribution system before entering the Alexandra Hills Reservoir Complex.

ALEXANDRA HILLS RESERVOIR COMPLEX

The Alexandra Hills Reservoir Complex provides water to the Alexandra Hills High Level and Low Level Distribution Zones. These two zones are also supplied from North Stradbroke Island from bores and The Herring Lagoon WTP. The Alexandra Hills High Level and Low Level Zones consume about 60% of Redland City's demand. On average 86% of the water for the Alexandra Hills High and Low Level Zones was supplied from the Capalaba WTP in 2009/2010 and 50% in 2011.

THMS IN THE DISTRIBUTION SYSTEM

Because of the high DOC in the Capalaba water, elevated levels of Trihalomethanes (THMs) and Haloacetic Acids (HAAs) can be formed. Formation occurs in the treatment plant, the reservoirs and in the distribution system. By contrast the water from NSI has very low DOC and forms very low THMs and HAAs. There have been a number of notifications of THM and HAA concentrations exceeding ADWG value for the Alexandra Hills Distribution Zones.

GUIDELINE VALUES FOR THMS AND HAAS

Discussion is provided in this report regarding the ADWG guideline values for THMs and HAAs. ADWG guideline values are considerably higher than USEPA or European Union guideline values. For this report the ADWG values have been adopted as there is considerable international debate as to the relevance of the lower values adopted by the USEPA. In his keynote address at the recent AWA Ozwater Conference in Adelaide, Steve Hrudey spoke about the USEPA THM "Regulatory Saga". This

was useful as it provided background as to how the USEPA THM standards, for chloroform in particular, have been established. In his paper Hrudey states that

What is clear from the toxicology is that THMs in drinking water are not responsible for bladder cancer. Bull et al. (2001) summarized the lack of carcinogenic evidence to support any further lowering of regulated levels of THM or haloacetic acids (HAA) in drinking water: "Of utmost concern is the fact that there is no evidence that decreasing THM and HAA concentrations of drinking water will reduce the risk from bladder cancer. There are no data to indicate any of these compounds can contribute to bladder cancer by any mechanism."

THMS AND HAAS IN THE DISTRIBUTION SYSTEM

Assessment has been carried out to determine the range of THMs and HAAs found at the water treatment plant, the Alexandra Hills Reservoir Complex and the Alexandra Hills High and Low Level Zones. More recent testing has been initiated by Allconnex Water at a number of new sampling points on the Alexandra Hills High and Low Level Zones. Typically THMs for the treated water at the Capalaba WTP vary between 80 and 170 µg/L. However during dirty water events these levels can increase to over 250 µg/L. Historically THMs in the Alexandra Hills Reservoir have been higher than the treatment plant THMs, but recent improvements by way of introduction of mixers and improved circulation has minimized any substantial increase in these reservoirs. There can be, however, an increase of 20 to 35 % in the part of distribution system supplied directly from the Capalaba WTP and bypassing the reservoir.

Both Wellington Point and Cleveland Point would have exceeded the ADWG value of 250 µg/L in 2009 using the 95 percentile value of the annual sample results. As these two sample points are the only two sample points which have long term sampling results no comparison can be made with other parts of the Alexandra Hills High and Low Level Zones. Wellington Point and Cleveland Point results would not meet current USEPA guideline values for THMs. It should also be recognized that there have been operational changes since 2009 which may have impacted on the propensity for THM development at certain locations.

Recent short term sampling carried out by Allconnex Water has showed that sample point M10 (Bailey Road Birkdale) had a higher median value (206 µg/L) than Wellington Point (199 µg/L) or Cleveland Point (128 µg/L) medians. These results could be effected by the timing of the sampling as if all samples were taken on the same day the water sampled at each sampling point may have had a different residence time in the distribution system and therefore be sourced from the treatment plant at a different time and with different water quality.

There appears to be an increase in THM values through the distribution system of up wards of 30 per cent although this is not consistent and varies from time to time. Reasonably if a target 95 percentile THM value of 250 µg/L was to be achieved at all points in the distribution system a target at the treatment plant would be 185 µg/L.

It is concluded that the THM values in the distribution system are verging on exceedance of the ADWG values and that urgent action is required to rectify the problem. THM values of water leaving the treatment plant should be of the order of 185 µg/L.

OPTIONS FOR THM REDUCTION

A range of options for reducing THM's at the treatment plant have been considered as follows:

- Treatment plant options to reduce DOC in the water;
- Options to reduce THM formation at the treatment plant;
- Options to reduce THM formation in the distribution system.

These are summarized in **Table 1.**

TABLE 1 OPTIONS FOR THM REDUCTION

Option	Benefit	Comment	Recommendation
Short Term Options to be considered			
Enhanced Coagulation	May have some benefit in reducing DOC and hence THM formation.	Limited trials have shown minimal improvement. Further investigation recommended.	Consider
PAC dosing	May have some benefit in reducing DOC and hence THM formation.	Some research has indicated enhanced coagulation in conjunction with PAC may be beneficial.	Consider in conjunction with enhanced coagulation.
Use of alternative coagulants	May have some benefit in reducing DOC and hence THM formation.	Alternative coagulants (PACl and Ferric Chloride) are known to improve DOC removal.	Consider
Treatment Plant Improvements	Provision of tube settlers in Clarifier No 3, improved flash mixing and improved chemical dosing facilities may improve treatment plant performance and operability particularly under dirty water conditions.	Individually may not provide a significant improvement but in combination and with enhanced coagulation or possibly alternative coagulants may achieve desired increase in DOC removal. Improved chemical dosing facilities will provide better control of alkalinity and pH.	Consider
Supply from QUU system north of Leslie Harrison dam	Spare capacity available from 300 mm distribution main which was set up to supply water from a borefield to the West of the Chandler Aquatic Centre.	Capacity available from QUU distribution main short term with extension of 300 mm main from Chandler and longer term with upgrading of main from Gateway Arterial to Chandler. Operational problems associated with mixing chloraminated water with	Consider

Option	Benefit	Comment	Recommendation
		chlorinated water.	
Shut down the plant during periods of high THM	Avoid use of water with high THMs during dirty water events.	Difficult to meet likely demands in peak times. Only a short term solution when demands are at current levels.	Consider as short term solution only.
Mix the Capalaba water with the NSI water prior to distribution	The dilution of the high THM water from Capalaba WTP with low THM water from NSI should achieve water quality objectives.	Isolate supply mains to Alexandra Hills Reservoir Complex from distribution system and mix with NSI water prior to storage. Reconfiguration of Alexandra Hills Reservoir Complex pipework required.	Consider
Changing operating procedures for the Capalaba WTP and Clear Water Pumps	Plant shut-down at trigger points during dirty water events would prevent high THMs entering the distribution system. Changing operating times for the Capalaba WTP and Clear Water Pumps may reduce period that high THM water enters the distribution system directly without mixing with NSI water.	Could be implemented relatively easily. May increase operating cost.	Consider as an interim measure.
Aeration	Aeration can remove chloroform which is the major component of the Capalaba THMs.	Trials have been successful.	Consider if other options prove unsuitable.
Short Term Options not to be considered			
Reduce or eliminate pre-chlorination prior to filters	May reduce THM formation but conversely there may be some benefits for Cryptosporidium removal with pre-chlorination.	Seqwater has advised that testing has shown this to have shown minimal impact on THM formation.	Don't consider further.
Long Term Options to be considered			
Upgrade the NSI	Replace Capalaba or use as an alternative supply source	Increase the number of bores on NSI to increase	Consider

Option	Benefit	Comment	Recommendation
system	in dirty water conditions.	supply capacity. Favourable long term solution.	
Change to Chloramination	Chloramination should eliminate THM/HAA problems.	Other DBPs may be formed and other operational problems may result (ie nitrates).	Consider
Biological Activated Carbon Filtration	Biological filters prolong life of carbon and should achieve effective removal of THMs. Would provide a suitable alternative to PAC dosing for taste and odour problems.	Could be incorporated post filters.	Consider
Ozonation	Oxidizes THM compounds.	Only minor benefit likely if not used with BAC.	Consider in conjunction with BAC.
Use EPI as an alternative source	Use as an alternative supply source in dirty water conditions. May be useful as a source supplement in dirty water conditions at Capalaba.	Short term option only and insufficient capacity for longer term. Operation problems with supply to Logan and operational problems associated with mixing chloraminated water with chlorinated water and delivery of water through to Alexandra Hills.	Consider
Long Term Options not to be considered			
Mothball Plant	Use alternative sources.	Possible if suitable alternative sources can be found. Substantial asset would need replacement.	Unlikely to be economically viable.
Granular Carbon Filtration	GAC will absorb THMs.	Possible conversion of existing Filters Nos 1 and 2 to GAC filters. Preliminary check shows that very short life of carbon. Also pressure filters would present considerable workplace health and safety issues in media replacement.	Don't consider further.

As a concluding comment it is noted that much of the information that has been sourced from the Water Entities, which is in spread sheet form, is very difficult to interrogate. A review of the formats used for data collection and entry is thus recommended in order to make it more readily usable for trend analysis and water system planning.

Further investigation is thus recommended for the options identified for further consideration in **Table 1.**

RECOMMENDATIONS

It is recommended that:

- Further investigations be carried out for the Options identified in **Table 1;**
- That compliance with the ADWG be on the basis that the 95th percentile of the running 12 month sample results is less than or equal to 250 µg/L;
- In order to prevent THMs exceeding 250 µg/L at the most critical points in the distribution system THMs should be limited to approximately 185 µg/L at the treatment plant;
- Until system improvements have been implemented it may be necessary to shut down the plant when the raw water turbidity exceeds 40 NTU or thereabouts in order that the THMs in the treated water at the treatment plant do not exceed 185 µg/L. It is noted that the adoption of 40 NTU is based on the analysis of results for one dirty water event. There is limited historic THM data available to assess the performance for other dirty water events and since 1 July 2008 there have only been a limited number of separate dirty water events which exceeded 30 NTU. Ongoing evaluation of this assumption is thus recommended.
- Sampling points be reviewed and expanded to ensure that distribution system hot spots are identified and monitored on a monthly basis (as a minimum). As a minimum this should include sample points M8, M10 and M16;
- Sampling and testing should be carried out at the same frequency and the same day for the three sample points noted above and concurrently at the treatment plant and the Alexandra Hills Reservoir Complex;
- In view of the variances between the results of THM testing by different laboratories , testing should be carried out by the same laboratory;
- In flow and outflow from the Alexandra Hills Reservoir Complex be monitored to establish the flow-through that is occurring in the reservoirs.
- A review of the formats used for data collection and entry by the three Water Entities be carried out in order to make the information more readily usable for trend analysis and water system planning.