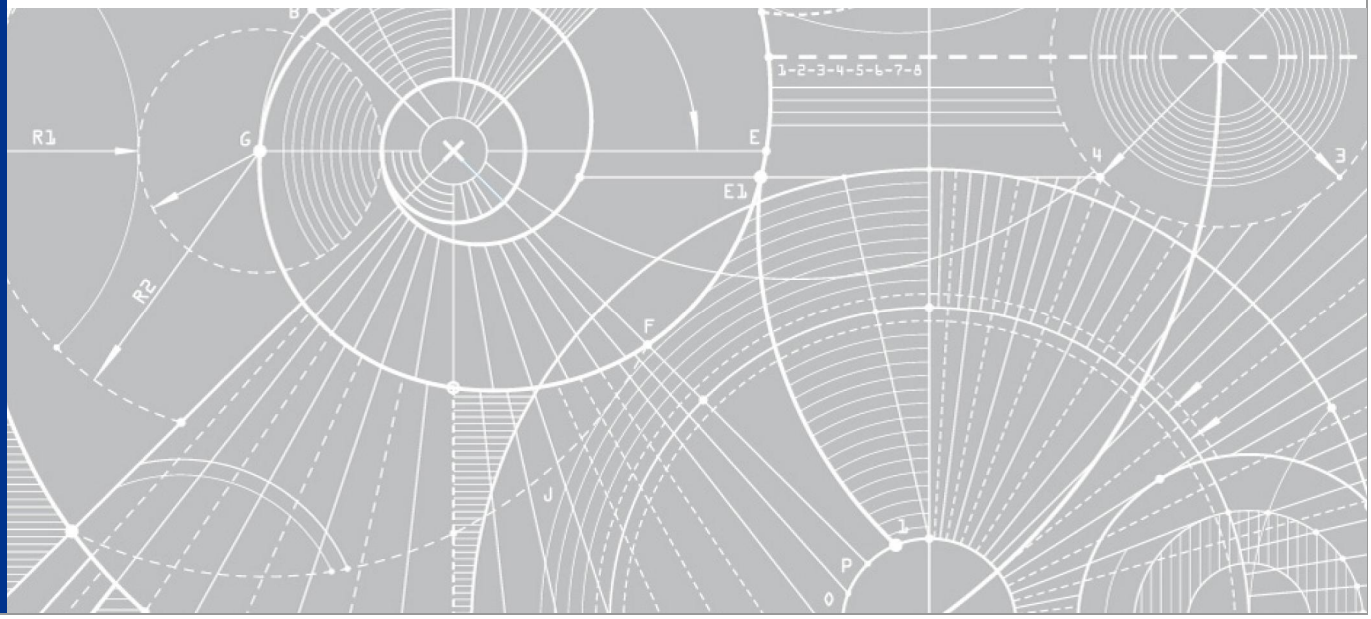
GAWB 2015-20 Review of Capex and Opex

QUEENSLAND COMPETITION AUTHORITY

Final Report

RO005400 | 7

29 May 2015



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Executive summary

The Queensland Competition Authority (QCA) is investigating the Gladstone Area Water Board's (GAWB's) prices for the period 1 July 2015 to 30 June 2020.

As part of its price monitoring investigation, the QCA is assessing the reasonableness of the prudency and efficiency of GAWB's capital expenditure (capex) and operating expenditure (opex), including proposed cost escalation rates.

Jacobs® (we) undertook an assessment of the technical aspects of GAWB's expenditures on behalf of the QCA, including:

- Capex prudency and efficiency – whether the proposed capex activities are prudent in standard and scope, and cost effective
- Opex prudency and efficiency – whether the proposed opex activities are prudent in standard and scope, and cost effective. The assessment also includes reviewing the impact of the different classification of cost categories proposed in a submission by GAWB
- Capex and opex trade-offs – whether GAWB's combination of capex and opex projects are resulting in least-cost outcomes. In particular, considering whether substituting more opex for lower capex would be a better approach or vice versa
- Cost escalation rates – the rates at which costs are changing, using a range of methods

An important aspect of the assessment involved determining cost-effective capex-and-opex combinations over an asset's life.

Gladstone Area Water Board (GAWB)

The GAWB is a commercialised statutory authority responsible to the Minister for Energy and Water Supply. GAWB owns and operates the Awoonga Dam on the Boyne River and a network of water pipelines, pump stations, reservoirs and treatment plants throughout the Gladstone region supplying raw and potable water to a customer base including the Gladstone Regional Council (GRC), power stations and industrial customers.

GAWB's main growth drivers are population growth and increasing current and future industrial and power generation requirements.

Prudency and efficiency assessments

Our findings and recommendations on GAWB's proposed expenditures are summarised in Table 1-3.

Table 1: Capital expenditure assessment

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Awoonga Dam	8,992 (QCA originally advised 8,307)	Regulatory	Prudency		The project is assessed as prudent as the primary driver of Compliance has been demonstrated through the requirement to the Acceptable Flood Capacity (AFC) Guidelines.	8,992	8,992	0
			Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are consistent with industry practice. The costs associated with the principal contract are consistent with prevailing market conditions. We note that the contract management services and consulting engineering services were sole soured, so hence may not have been efficient. However, we do not recommend any specific cost reductions as it is not practicable to determine with any degree of substantiation the difference between actual costs and market (i.e. efficient costs) had these services been put out to tender.			
Offline Storage and Repump Station	21,106	Risk	Prudency		The project does not strictly meet the primary driver (as per the QCA TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' as the project has not been explicitly endorsed by customers. However, Jacobs concurs that there is a need for GAWB to undertake condition assessment and maintenance on critical assets and note that this links to the good practice clause in customer contracts. As such, we find the need for expenditure to be prudent albeit that, regulatory approval under this driver requires customer endorsement.	13,072	13,072	-8,034
			Efficiency		Regulatory efficiency is a two-part test: 1. Firstly whether the regulated entity's preferred option reflects the least cost in terms of the total of capex and opex over the life of the asset whilst providing the greatest utility in terms of the regulatory driver. Therefore, when comparing options with			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
					different asset lives we consider the life cycle (or NPV) cost of the various options over the period of the longest life option, together with the extent to which each option delivers on the regulatory driver. An exception is when the regulatory driver has a shorter life than one of the options, in which case the comparison of life cycle costs is limited to the duration of that driver. 2. Secondly, whether the costs proposed by the entity for its preferred option are the costs that would be incurred by a knowledgeable and efficient operator. In view of the two part test, we consider: 1. That the life of the regulatory driver is not relevant (or limited) in this case. Therefore, the option with the least cost NPV over the life of the longest-life asset that delivers the highest utility per unit of cost will be preferred. We note GAWB's submission that the NPV costs of our preferred technical solution (Pontoon Pump Station) and theirs (Offline Storage) are sufficiently similar to disqualify cost as the deciding factor. The basis of this NPV comparison has not been provided. We note that our solution delivers more days of storage than the Offline Storage and therefore greater utility. GAWB has submitted a list of maintenance activities that could take over 14 days to undertake, which would not be possible to achieve using the Offline Storage option. In addition, access to a greater storage could allow for several maintenance activities to be undertaken concurrently during the same shut down period resulting in efficiencies; and to provide a larger buffer for unforeseen eventualities. In summary, our solution is efficient in terms of this first criterion. By comparison, on the first test, GAWB's preferred solution may			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
					deliver less utility for a higher capital cost and likely life cycle cost, making it inefficient when compared to our option. 2. On the second test, we consider that GAWB is a knowledgeable and efficient operator and that, all things being equal, the proposed cost of its preferred solution is efficient. Similarly, our review of GAWB's submitted costs, for our preferred option, supports our view that the Pontoon Pump Station costs are also efficient. Accordingly, our option is efficient on both criteria and GAWB's is partially efficient.			
South Trees Pipe Bridge	1,685	Risk	Prudency		The project is assessed as prudent as the primary driver of risk mitigation, which we map onto the QCA regulatory driver of replacement (refurbishment) has been demonstrated. The condition assessment found that the pipe bridge is suffering various forms of corrosion with the risk assessed as 'high'. The project meets the QCA's definition of prudency as it is required as a result of renewal of existing infrastructure, which is in use and useful (i.e. it is required to deliver a regulated service).	1,685	1,685	0
			Efficiency		The project is assessed as efficient. The scope of works is appropriate. An independent cost estimate has been developed on GAWB's behalf for the works which is considered appropriate for the current phase of the project. We have undertaken a high level review of the costs and found them to be within our benchmark order of magnitude cost estimates.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Boat Creek Expansion	3,986	Risk	Prudency		The project is assessed as prudent. The need for the project has been demonstrated; the increase of storage at Boat Creek reservoir is necessary to meet GAWB's internal objective to maintain a minimum of 24 hours supply in all parts of the delivery network. However, the primary driver (as per the QCA's TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' has not been demonstrated. We strongly recommend that GAWB seeks and obtains written customer approval for this project prior to proceeding to create a direct link to the regulatory driver.	2,899	2,899	-1,087
			Efficiency		The project is assessed as partially efficient. The methodology used for the selection of the preferred option is not robust and as such appropriateness of the scope of the preferred option has not been demonstrated. Whilst we agree that designing infrastructure to cater for future demand is appropriate, we have not been provided with documentation supporting the potential growth in demand or setting out how the required size of the storage has been determined. As the costs have been based on a storage size larger than has been demonstrated to be required, the costs currently included in the budget are considered by us to be excessive and hence are not efficient. In our recommended costs we have allowed for 10ML storage to maintain a minimum of 24 hours supply in all parts of the delivery network.			
Low Lift & High Lift Pump Station	5,087	Replacement	Prudency		The project, as defined in single line diagram (SLD) 210-E-00151 revision B, is assessed as prudent as the primary driver of pump redundancy has been demonstrated through improved power supply distribution facilities. The requirement for the increase in capacity is in line with what is required to meet GAWB's understanding of Gladstone Council's likely increase in demand per annum for potable water.	5,087	5,087	0

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
			Efficiency		The project is assessed as efficient as the scope is appropriate for the assumed 20% demand growth. The standards of works are consistent with industry practice. However, the current cost estimates are based on the scope defined in SLD 210-E-00151 revision B, which includes VSDs for low lift pumps. SLD 210-E-00151 revision D shows the low lift pumps will be made redundant by larger high lift pumps. A revised cost estimate is required for the change in scope defined in SLD 210-E-00151 revision D. Hence we consider GAWB's costs to be efficient based on the costings for the project scope as defined in SLD 210-E-00151 revision B.			
East End Reservoir	1,177	Replacement	Prudency		The project is assessed as prudent as the primary driver of renewal has been demonstrated through evidence of the deterioration of the existing infrastructure.	1,177	1,177	0
			Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are anticipated to be consistent with industry practice given the standard or works implemented by GAWB that we have previously reviewed. An independent cost estimate has been developed for the works which is considered appropriate for the current phase of the project. We have reviewed the costs for undertaking the works and found them to be within the range our order of magnitude (+40%/-20%) benchmark cost estimates. We consider that the sole sourcing of reservoirs condition/risk assessment services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not market tested. However, we have not recommended a reduction in costs on this basis.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Dam Safety Compliance Works	4,444	Past	Prudency		The project is assessed as prudent as the primary driver of Compliance has been demonstrated through the requirement to meet the Dam Safety Management Guidelines for a referable dam under the Water Supply (Safety & Reliability) Act.	4,444	4,444	0
			Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are anticipated to be consistent with industry practice. The majority of the costs associated with the principal contracts are consistent with prevailing market conditions. Variations have been well documented and approved following appropriate processes. However, we consider that the sole sourcing of project management and technical services may not have resulted in efficient costs.			
North Industrial Zone Potable Upgrade	6,649	Growth	Prudency		The project is assessed as prudent as the need for the project has been demonstrated; the YWTP is currently at, or beyond capacity, and a solution is required to maintain supply to customer in the North Industrial Zone.	5,663	6,649	0
			Efficiency		The project is assessed as efficient. The indirect cost allowances used in the GAWB cost estimate are high and we have recommended that GAWB reviews the establishment and mobilisation/demobilisation cost, which is based on 28% of the direct costs. However, the project costs are within +30% of our order of magnitude benchmark costs and are hence deemed efficient.			

^ Jacobs Recommended Expenditure is derived from our assessment of efficiency. For projects determined not to be prudent, we recommend that the efficient cost for GAWB is zero ($0).

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient).

Table 2: Operating expenditure assessment

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
Staffing costs, operations		2,863	2,970	3,061	3,162	3,272	3,397	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to supply the proper quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.	2,955	3,055	3,159	3,275	3,395
								Efficiency		Operations FTEs have increased from under 16 FTEs in 2010 to 23.5 FTEs in 2014. We are of the opinion that an increase in 7.2 FTEs only from the 2010 level is justified for operations based on the additional responsibilities and obligations of the organisation. This is due to the implementation of the DWQMP as well as the requirement for 24 hours 7 days operation at the WTPs. The difference between the number of FTEs we consider efficient and the number of FTEs proposed by GAWB, as being 0.3FTEs, is not considered material.					

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
Staffing costs: ALCM	3,769		3,970	4,093	4,229	4,377	4,546	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to properly maintain its infrastructure and supply the quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.	3,821	3,955	4,094	4,249	4,410
								Efficiency		ALCM FTEs have increased from 19 FTEs in 2010 to 35.5 FTEs in 2015. We are of the opinion that an additional 15.5 FTEs from the 2010 level is justified for ALCM based on the additional responsibilities and obligations of the organisation, resulting in our recommendation of 34.5 FTEs in 2015. We recommend resolution of the misclassification of a water treatment plant operator position.					
Maintenance	2,174		2,308	2,257	2,790	2,463	2,810	Prudency		Core activity in the supply of bulk water. Proper maintenance of assets, programmes and systems are required to meet customer expectations and the Drinking Water Quality Management Plan.	2,308	2,259	2,795	2,470	2,821

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
								Efficiency		Maintenance capabilities are being improved resulting in a better understanding of the maintenance requirements of the network. Efficiencies should start to be realised when asset conditions and maintenance requirements are fully known.					
Insurance	736		772	810	850	892	936	Prudency		GAWB faces some risks of events occurring beyond its control which may result in losses that would threaten is business viability. Obtaining insurance for such events is prudent.	754	792	832	873	917
								Efficiency		The insurance contracts obtained by GAWB were market tested and were subject to the competitive quotation process. While we find that GAWB's proposed insurance expenditure is efficient we recommend that the expenditure is reduced to reflect a lower escalation rate over the regulatory period. The escalation rate applied by GAWB is consisting with our analysis.					
Motor Vehicles	750		767	786	806	826	847	Prudency		Motor vehicles fit for purpose are required due to the extent and terrain in which GAWB operates	743	761	780	800	820

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
								Efficiency		Acquisition of Toyota Camry is unnecessary although any savings are minor due to the need to source alternative transport (taxis) when there is a co-incident requirement for two vehicles. Proposed fuel costs are not consistent with prevailing market conditions.					
Electricity		1,991	2,186	2,401	2,631	2,796	2,971	Prudency		Electricity is required for the pumping and treatment of water and the volume of energy used is dependent on demand for water. The cost of electricity is dependent on the time of use and the maximum demand.	2,198	2,263	2,381	2,462	2,548

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
								Efficiency		The expenditure is assessed as partially efficient under the current operating constraints as we consider that the escalators applied by GAWB are inconsistent with recent AER draft determinations and Ergon Energy's pricing submission to the AER. We also expect that risk management measures could be implemented to limit adverse electricity market price movements which will lead to lower electricity prices in base year prices as well as prices in subsequent years. We further expect that efficiencies in the use and cost of electricity can readily be achieved once the operating constraints that GAWB faces are relaxed by various capital works initiatives e.g. installation of VSDs limiting peak demand charges and installation of higher pumping capacity at GWTP allowing greater off-peak pumping.					
Chemicals		808	828	849	870	892	914	Prudency		Chemicals are required in the treatment of water and the quantity used is dependent on demand and the quality of the raw water.	827	849	872	896	920

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
								Efficiency		Whilst the forecast usage levels of chemicals are higher than average historical usage levels, the forecast usage is below peak usage. The higher than average forecast will provide a margin in the event that chemical usage increases due to a deterioration in source water quality.					

Where:

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- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

Table 3: Cost Escalation Rate Assessment

Cost category	GAWB proposal	Jacobs recommendation	Change
Staffing costs	2016: 3.29% 2017: 3.13% 2018: 3.38% 2019: 3.61% 2020: 3.97% (Average: 3.5%)	2016: 3.3% 2017: 3.5% 2018: 3.5% 2019: 3.8% 2020: 3.8% (Average: 3.6%)	↔ ↑ ↑ ↑ ↓
Electricity	2016: 9.83% 2017: 9.82% 2018: 9.60% 2019: 6.25% 2020: 6.25% (Average: 8.4%)	2016: 3.5% 2017: 6.1% 2018: 4.2% 2019: 4.2% 2020: 4.2% [Average: 4.4%]	↓ ↓ ↓ ↓ ↓
Maintenance	2.5%	2.6%	↑
Chemicals	2.5%	2.7%	↑
Other expenditure	2.5%	2.5%	↔
Professional services	3.4%	1.8%	↓
Insurance	2016: 5.0% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 5.0%)	2016: 2.5% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 4.5%)	↓ ↔ ↔ ↔ ↔
Regulatory fees	5.8%	Not proposed*	**n.a.**
Council rates	2.6%	5.0%	↑
All Capex items	2.5%	CPI[1]	↔

Note: * The purpose of the regulatory fees is to recover fixed regulatory costs, incurred predominantly by the QCA in 2015. This is more akin to an annuity. Therefore, we consider as reasonable any approach that recovers the efficient regulatory costs, in real terms, over the regulatory period.

We thank GAWB for the open and responsive manner in which it responded to our requests for information and, in particular, making its senior staff, project managers and advisors available to discuss the intricacies of the various projects forming this review. We note that GAWB's business plans made available for the projects reviewed, and provided to us, are among the best that we have seen, in terms of clarity and robustness, in our experience of undertaking multiple similar reviews over several years. GAWB are to be congratulated.

[1] Whilst we refer to CPI as being the escalation rate, the technically accurate description is 'percentage changes in the CPI'. We have adopted the term 'CPI' instead of 'percentage changes in the CPI' for brevity.

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to review the capital and operating expenditures and escalation rates proposed by Gladstone Area Water Board in the 2016 Price Monitoring Investigation, in accordance with the scope of services set out in the contract between Jacobs and the Queensland Competition Authority. That scope of services, as described in this report, was developed with the Queensland Competition Authority.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Queensland Competition Authority and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Queensland Competition Authority (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, the Queensland Competition Authority, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Queensland Competition Authority. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

Limitations Statement

Forecasts are by nature uncertain. Jacobs has prepared these projections as an indication of what it considers the most likely outcome in a range of possible scenarios. These forecasts represent the author's opinion on what is considered to be reasonable forecasts, as at the time of production of this document and based on the information set out in this report.

Jacobs has used a number of publicly available sources, other forecasts it believes to be credible, and its own judgement and estimates as the basis for developing cost escalators contained in this report. The actual outcomes will depend on complex interactions of policy, technology, international markets, and behaviour of multiple suppliers and end users, all subject to uncertainty and beyond the control of Jacobs, and hence Jacobs cannot warrant the projections contained in this report.

1. Introduction

1.1 Project description

The QCA is investigating the GAWB's prices for the period 1 July 2015 to 30 June 2020. The aim of the investigation is to assess the reasonableness of GAWB's proposed expenditures, considering the risks and needs for such expenditures, so that customers may pay a fair price.

As part of its price monitoring investigation, the QCA is assessing the prudency and efficiency of GAWB's capital expenditure (capex) and operating expenditure (opex), including proposed cost escalation rates.

We were engaged to assist with technical aspects of GAWB review, including assessing the following activities in meaningful consultation with key stakeholders:

- **Capex (Component 1)** – determine the prudency and efficiency of a sample of GAWB's proposed capex from 2010-11 to 2013-14 (historical), 2014-15 (budget) and 2015-16 to 2034-35 (forecast) and recommend whether the findings can be extrapolated to projects outside of the sample referencing appropriate benchmarks.
- **Opex (Component 2)** – determine the prudency and efficiency of a sample of GAWB's proposed opex for 2014-15 (budget) and from 2015-16 to 2019-2020 (forecast) and recommend whether the analysis can be extrapolated to un-sampled opex, referring to appropriate benchmarks. A high level review of GAWB's submission on the reclassification of its opex functions which occurred since 2010 is also required.
- **Capex and opex trade-offs (Components 1 and 2)** – determine substitution possibilities between capex and opex activities, to reveal if there are more efficient (and prudent) capex and opex combinations than proposed by GAWB, taking into consideration demand management and other operational solutions.
- **Cost escalation rates (Component 3)** – determine whether the escalation rates for capex and opex categories (from 2015-16 to 2034-35) are appropriate and recommend escalation rates for each opex cost item, including for electricity costs.

The QCA seeks to provide a channel for GAWB's customers to openly provide their views on the prudency and efficiency of GAWB's proposed costs and other matters.

1.2 Sample size (provided by QCA)

The following capex and opex samples were provided by the QCA for the review.

Table 4: Sample capital projects

Price Zone	Project	Project Expenditure ($)	Year	Driver
Awoonga	Awoonga Dam - Spillway Capacity Upgrade (implementation)	8,307,053	2015	Regulatory
Awoonga_to_Toolooa	Offline Storage & Repump Station	21,105,968	2017	Risk
Boyne_Raw	South Trees Pipe Bridge Structural Refurbishment	1,685,100	2016	Risk
Mt_Miller_Pipeline	Boat Creek Expansion – Including Refurbish and Secure Land	3,986,071	2017	Risk
Gladstone_WTP	Low Lift & High Lift Pump Station Switchboard & Variable Speed Drives	3,785,945	2016	Replacement
Boat_Creek_to_East_End	East End Reservoir - Various Works	1,176,700	2017	Replacement
Awoonga	Dam Safety Compliance Works	4,444,330	2015	Past
North Industrial Potable	North Industrial Zone Potable Upgrade	6,649,000	2015-16	Growth

Table 5: Sample operating expenditure items

Operating Category	ALCM(2015 $'000)	Operations(2015 $'000)
Staffing	3,769	2,863
Maintenance	2,174	
Insurance	736	
Motor Vehicles	750	
Electricity		1,991
Chemicals		808

We have prepared a standalone 'mini' report for each of the sample capital projects and operating expenditure items. This report documents our assessment of the prudency and efficiency of the sample capital expenditure and operating cost for GAWB for the 1 July 2015 to 30 June 2020 period and our standalone mini reports are reproduced as appendices to this report

1.3 Introduction to GAWB

The GAWB is a commercialised statutory authority responsible to the Minister for Energy and Water Supply that owns the Awoonga Dam on the Boyne River and a network of pipelines, pump stations, reservoirs and treatment plants. It supplies raw and potable water to municipal and industrial customers in the Gladstone region.

The objectives of GAWB are to meet the demand requirements of current and future customers while balancing water availability, reliability, quality and price requirements with risk.

GAWB's capital expenditure proposals and price are regulated by the QCA to ensure that they are reflective of the efficient expenditure necessary to supply customers while allowing GAWB to achieve an appropriate level of return on the assets employed by the business. The QCA regulatory period is five years and this price monitoring covers the regulatory period 2015 to 2020.

1.3.1 Assets and customers

GAWB owns and operates:

- The Awoonga dam on the Boyne River
- Delivery pipelines, for delivery of untreated water to treatment plants and industrial customers and for delivery of treated water to Gladstone Regional Council's reticulation systems and to other industrial customers
- Two water treatment plants in Gladstone City and Yarwun
- Raw water pumping station at Awoonga Dam and potable water pumping stations at Benaraby, Calliope, Glen Eden, Boat Creek, Curtis Island, Gladstone Water Treatment Plant and Yarwun Water Treatment Plant
- Raw water reservoirs at Gladstone, Toolooa and Boat Creek and potable water reservoirs at Boyne Island, Curtis Island, East End, Golegumma, Mt Miller and South Gladstone
- Lake Awoonga Recreation Area adjacent to Awoonga Dam (including a waste water treatment plant) and Boynedale Bush Camp on the western shores of Lake Awoonga
- Approximately 30,000 hectares of land
- A fish hatchery in Gladstone City

GAWB's customer base includes industry, power stations, small domestic customers and the GRC with the majority of the demand arising from GAWB's industrial and power station customers and the majority of that supply being raw water.

1.3.2 Water sources and future demand

GAWB's sole water source is the Awoonga Dam with a capacity of 776,854 ML, the fourth largest in Queensland. GAWB is allowed to extract 78,000 ML per annum based on the 100% Historic No Failure Yield (HFNY).

In addition to the Awoonga Dam supply, GAWB currently holds a reservation of 30,000 ML per annum under the Fitzroy Basin Resource Operations Plan 2011. This gives GAWB the option of an additional water source from the Fitzroy river should it choose to construct a pipeline and water storage infrastructure.

We recognise that GAWB is not a typical bulk water supplier in that many of its customers represent critical loads that cannot be interrupted or have limited capacity to withstand interruptions more than a few hours. Further, the demands of GAWB's industrial customers are very much process driven and hence tend to be 'lumpy' which makes prediction of both short term and long term demand difficult.

1.3.3 Risks and mitigation

The reliability of the water supply is determined by the hydrology of the catchment source, management of the water supply and engineering risk inherent in the delivery system.

There are also inherent risks associated with various failures in its delivery network. GAWB has undertaken an assessment of its delivery network to assess credible risks of supply interruption and actions required to mitigate those risks. Any capital investment will form part of its capital expenditure submissions to the QCA for the 2015-2020 price monitoring.

1.4 The role of the QCA

The QCA is an independent statutory authority responsible for assisting with the implementation of competition policy for government owned businesses in Queensland. Under the Queensland Competition Authority Act, the QCA's roles in relation to the water industry are to:

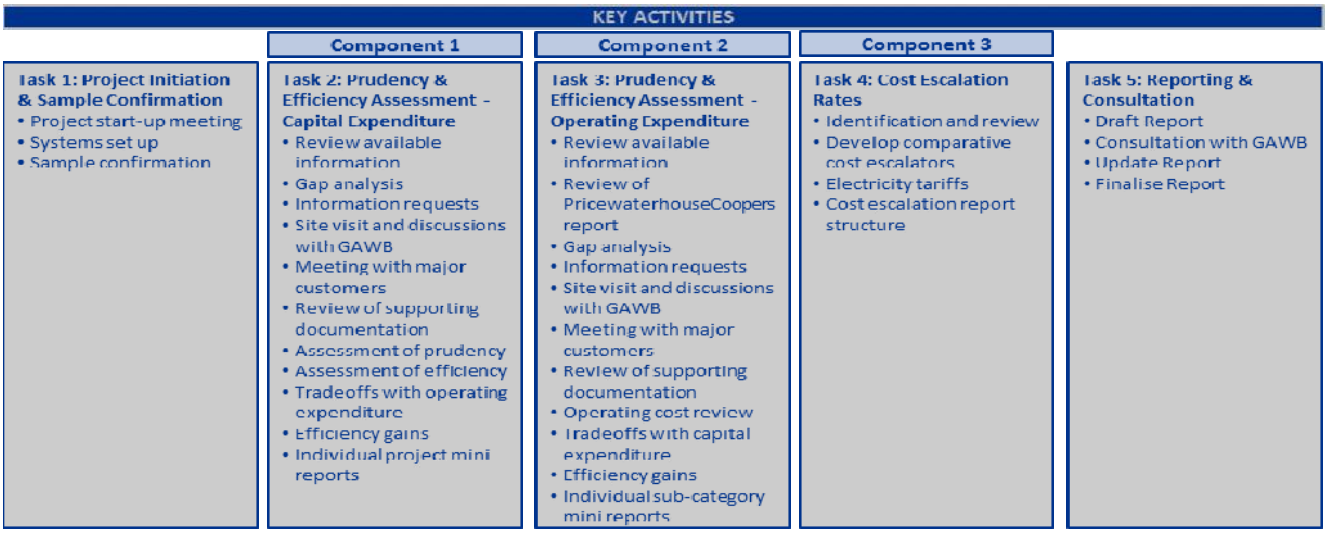
- Investigate and report on the pricing practices of certain declared monopoly or near monopoly business activities of State and local governments
- Receive, investigate and report on competitive neutrality complaints
- Mediate and/or arbitrate access disputes and water supply disputes
- Investigate and report on matters relevant to the implementation of competition policy

The QCA has been directed to conduct a price monitoring investigation of GAWB's prices for the period 1 July 2015 to 30 June 2020.

2. Method

2.1 Overview

Our method for undertaking the assessment is summarised in the following key activities and is aligned with the terms of reference issued by the QCA.



We would like to thank GAWB for the open and responsive manner in which it responded to request for information and, in particular, making its senior staff, project managers and advisors available to discuss the intricacies of the various projects forming this review. We would also like to note that the business plans available for the projects reviewed and provided to us are amongst the best that we have seen in terms of clarity and robustness in our experience of undertaking multiple similar reviews over several years.

2.2 Prudency and efficiency

We have adopted the following definitions of prudency and efficiency of operating costs and capital expenditure generally in accordance with those set out by the QCA in its terms of reference:

Operating expenditure is ***prudent*** if it:

- Is required as a result of a legal obligation, new growth, renewal of existing infrastructure, or
- Achieves an increase in the reliability or the quality of supply that is explicitly endorsed or desired by customers or external agencies

Operating expenditure is ***efficient*** if it is undertaken in a least-cost manner over the life of the relevant assets, taking into account prudent capex-opex trade-offs and is consistent with relevant benchmarks.

Capital expenditure is ***prudent*** if it:

- Is required as a result of a legal obligation, new growth, renewal of existing infrastructure, or
- It achieves an increase in the reliability or the quality of supply that is explicitly endorsed or desired by customers or external agencies.

Capital expenditure is ***efficient*** if:

- The scope of the works (which reflects the general characteristics of the capital item) is the best (most cost effective) means of achieving the desired outcomes after having regard to the options available, including more cost-effective network solutions, the substitution possibilities between capital and operating expenditure and non-network alternatives such as demand management.

- The standard of the works conforms to technical, design and construction requirements in legislation, industry and other standards, codes and manuals. Compatibility with existing and adjacent infrastructure is relevant, as is consideration of modern engineering equivalents and technologies. Compliance with regulatory obligations is likely to be highly relevant.
- The cost of the defined scope and standard of works is consistent with conditions prevailing in the markets for engineering, equipment supply and construction. In assessing such, we have substantiated our view with reference to relevant interstate and international benchmarks and information sources.

2.3 Scope exclusions

The following items are outside of the scope of our review and hence this report:

- Review of other parts of a project for which a specific part is being undertaken as part of the commission, e.g. the review of a supply contract when Jacobs is reviewing the installation contracts of supplied goods
- Development of detailed budget cost estimates for the capital projects under review
- Review of capital project governance processes other than in the course of review of individual capital projects
- Review of GAWB's demand forecast

2.4 Report overview

This report is structured as follows:

- **Section 1** provides an introduction to the project, background in respect to the Gladstone Area Water Board, and the scope of this review
- **Section 2** outlines Jacobs' approach for undertaking the review
- **Section 3** outlines Jacobs' prudency and efficiency analysis of the sample capex projects and opex items
- **Section 4** outlines Jacobs' prudency and efficiency assessment and expenditure recommendations
- **Section 5** outlines Jacobs' assessment of GAWB's cost escalators
- **Section 6** outlines the review of GAWB's cost allocations
- **Section 7** provides a summary of the overall conclusions

3. Prudency and efficiency analysis

This section provides a summary of the capital and operating expenditure reviews that were undertaken. An overview of our assessment and findings of the prudency and efficiency of the proposed expenditures are presented along with our recommendation on the expenditures. Our full, stand-alone mini reports on each of these items of expenditure are contained in Appendix A to Appendix P.

We have used a 'traffic light' representation of our key findings on prudency and efficiency in the summary tables in our report where the following key applies:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

3.1 Capital expenditure

The following sections provide a summary of the eight projects reviewed in detail. GAWB has informed us that the values included in this report do not reflect the final pricing model costs, as they do not include escalation or Return on Investment costs.

3.1.1 Awoonga Dam - spillway capacity upgrade (implementation)

The project involves the raising of Saddle Dam 3, the raising of the Awoonga Dam left abutment and the construction of an auxiliary spillway channel below Saddle Dam 6. These works are required to meet acceptable flood capacity (AFC) requirements as issued by DERM (now DEWS). The project is currently being implemented with completion anticipated in October 2015.

The project was previously reviewed by the QCA in the 2010. This 2010 review concluded that significant expenditure is required to meet dam safety standards within the next regulatory period and approved an indicative cost estimate of $22 million. Subsequently, further investigations have been undertaken by GAWB and its consultants to confirm the scope of works. This has resulted in a reduction in projected capex of $13 million. At the time of writing the forecast capital expenditure is $9 million.

From our analysis Jacobs conclude that the project is prudent and efficient. An overview of the findings of the prudency and efficiency of the project is presented in Table 6.

Table 6: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Awoonga Dam Spillway Capacity Upgrade	Prudency		The project is assessed as prudent as the primary driver of Compliance has been demonstrated through the requirement to the AFC Guidelines.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are consistent with industry practice. The costs associated with the principal contract are consistent with prevailing market conditions. We note that the contract management services and consulting engineering services were sole sourced, so hence may not have been efficient. However, we do not recommend any specific cost reductions as it is not practicable to determine with any degree of substantiation the difference between actual costs and market (i.e. efficient costs) had these services been put out to tender.

We consider that the efficient expenditure for this capital project is $8.99 million.

3.1.2 Offline storage and repump station

The project involves the construction of 1,200ML in-system storage and a repump station located at Toolooa, between Awoonga Dam and Toolooa Reservoir. This project was identified through a risk assessment undertaken by GAWB in relation to the reliance of GAWB's delivery network on the daily operation of the Awoonga Dam Pump Station (ADPS). The detailed design is currently being undertaken with construction anticipated to be completed in 2017.

The project was previously reviewed by the QCA in the 2010. This 2010 review concluded that further investigative work on the range of options to improve system storage capability was required prior to proceeding. As such, the QCA included $2 million to undertake this work, from the $22 million proposed by GAWB. At the time of writing the forecast capital expenditure is $21.95 million.

During this investigation we have reviewed the options considered by GAWB in the selection of its preferred solution. There are two key options; the preferred option selected by GAWB consisting of an Offline Storage and an alternative solution of a Pontoon Pump Station. We acknowledge that both options are valid and have specific benefits. For example, the Offline Storage option mitigates risks associated with the main transfer pipe between Awoonga Dam and Toolooa Reservoir. However, as the Pontoon Pump Station provides greater capacity at a lower capital cost and most likely a lower overall lifecycle costs (pending our recommendation that this be investigated further). Accordingly, the Pontoon Pump Station is our preferred technical solution.

At this stage, the design of the Pontoon Pump Station has only been developed to a concept design level. We recommend that GAWB further considers this option, including the mooring system proposed within this report. As part of this report, we have outlined how GAWB's primary concerns with the Pontoon Pump Station could be addressed, including securing the Pontoon Pump Station to avoid dam safety risks and not operating the Pontoon Pump Station during a flood. In the advent that during the subsequent investigations, there are found to be fatal flaws with the Pontoon Pump Station (for example, if the geotechnical information suggests that GAWB will be unable to effectively install the mooring system, the health and safety risks cannot be satisfactorily mitigated or the cost estimates are found to be materially higher than initially estimated) then the Offline Storage would default to be the preferred option.

From our analysis we conclude that the project is **prudent** and **partially efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table 7.

Table 7: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Offline Storage and Repump Station project	Prudency		The project does not strictly meet the primary driver (as per the QCA TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' as the project has not been explicitly endorsed by customers. However, Jacobs concurs that there is a need for GAWB to undertake condition assessment and maintenance on critical assets and note that this links to the good practice clause in customer contracts. As such, we find the need for expenditure to be prudent albeit that, regulatory approval under this driver requires customer endorsement.
	Efficiency		Regulatory efficiency is a two-part test: 1. Firstly whether the regulated entity's preferred option reflects the least cost in terms of the total of capex and opex over the life of the asset whilst providing the greatest utility in terms of the regulatory driver. Therefore, when comparing options with different asset lives we consider the life cycle (or NPV) cost of the various options over the period of the longest life option, together with the extent to which each option delivers on the regulatory driver. [An exception to this is when the regulatory driver has a shorter life than one of the options, in which case the comparison of life cycle costs is limited to the duration of that driver.] 2. Secondly, whether the costs proposed by the entity for its preferred option are the costs that would be incurred by a knowledgeable and efficient operator. In view of the two part test, we consider:

Project	Assessment	Outcome	Summary
			1. That the life of the regulatory driver is not relevant (or limited) in this case. Therefore, the option with the least cost NPV over the life of the longest-life asset that delivers the highest utility per unit of cost will be preferred. We note GAWB's submission that the NPV costs of our preferred technical solution (Pontoon Pump Station) and theirs (Offline Storage) are sufficiently similar to disqualify cost as the deciding factor. The basis of this NPV comparison has not been provided. We note that our solution delivers more days of storage than the Offline Storage and therefore greater utility. GAWB has submitted a list of maintenance activities that could take over 14 days to undertake, which would not be possible to achieve using the Offline Storage option. In addition, access to a greater storage could allow for several maintenance activities to be undertaken concurrently during the same shut down period resulting in efficiencies; and to provide a larger buffer for unforeseen eventualities. In summary, our solution is efficient on this first criterion. By comparison, on the first test, GAWB's preferred solution may deliver less utility for a higher capital cost, arguably making it inefficient when compared to our option. 2. On the second test, we consider that GAWB is a knowledgeable and efficient operator and that, all things being equal, the proposed cost of its preferred solution is efficient. Similarly, our review of GAWB's submitted costs, for our preferred option, supports our view that the Pontoon Pump Station costs are also efficient. Accordingly, our option is efficient on both criteria and GAWB's is partially efficient.

Jacobs concludes that an efficient cost for this expenditure should be based on the Pontoon Pump Station ($13.1 million) which allows assessment and maintenance of critical assets be adopted by the QCA.

3.1.3 South Trees Pipe Bridge structural refurbishment

The South Trees Pipe Bridge is an existing pipe bridge built circa 1985, to carry two pipelines (one for treated water and the other for raw water) to Boyne Island across the South Trees arm of the Boyne River. The bridge is the sole support for the treated water pipeline that services the Boyne Island and Tannum Sands precincts along with the raw water pipeline that supplies the Boyne Smelter. The project involves the repair of the South Trees Pipe Bridge structure, including reinstatement of protective coatings to pipelines, concrete rehabilitation (bridge structure, pile caps and columns), and protective works to marine support structure (pile wraps and cathodic protection to steel reinforcement).

From our analysis we conclude that the project is **prudent** and **efficient**. Table 8 presents an overview of the findings of the prudency and efficiency of the project.

Table 8: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
South Trees Pipe Bridge Structural Refurbishment	Prudency		The project is assessed as prudent as the primary driver of risk mitigation, which we map onto the QCA regulatory driver of replacement (refurbishment) has been demonstrated. The condition assessment found that the pipe bridge is suffering various forms of corrosion with the risk assessed as 'high'. The project meets the QCA's definition of prudency as it is required as a result of renewal of existing infrastructure, which is in use and useful (i.e. it is required to deliver a regulated service).
	Efficiency		The project is assessed as efficient. The scope of works is appropriate. An independent cost estimate has been developed on GAWB's behalf for the works which is considered appropriate for the current phase of the project. We have undertaken a high level review of the costs and found them to be within our benchmark order of magnitude cost estimates.

We consider an efficient expenditure to be $1.685 million.

3.1.4 Boat Creek expansion

The project involves establishing an increase to the available storage capacity at Boat Creek from 29 ML to 38.5 ML. The project is proposed to be undertaken in a number of stages. Stage 1 involves increasing the current capacity by creating a new reservoir immediately to the north of the existing reservoir and dewatering and cleaning out of material from the existing Boat Creek reservoir; while Stage 2 involves the expansion of the existing reservoir to the south. It is to be noted that this review only covers the cleaning of the reservoir and the Stage 1 expansion.

The project has not been previously reviewed by the QCA.

From our analysis we conclude that the project is **prudent** and **partially efficient**. Table 9 presents an overview of the findings of the prudency and efficiency of the project.

Table 9: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Boat Creek Expansion	Prudency		The project is assessed as prudent. The need for the project has been demonstrated; the increase of storage at Boat Creek reservoir is necessary to meet GAWB's internal objective to maintain a minimum of 24 hours supply in all parts of the delivery network. However, the primary driver (as per the QCA's TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' has not been demonstrated. We strongly recommend that GAWB seeks and obtains written customer approval for this project prior to proceeding to create a direct link to the regulatory driver.
	Efficiency		The project is assessed as partially efficient. The methodology used for the selection of the preferred option is not robust and as such appropriateness of the scope of the preferred option has not been demonstrated. Whilst we agree that designing infrastructure to cater for future demand is appropriate, we have not been provided with documentation supporting the potential growth in demand or setting out how the required size of the storage has been determined. As the costs have been based on a storage size larger than has been demonstrated to be required, the costs currently included in the budget are considered by us to be excessive and hence are not efficient. In our recommended costs we have allowed for 10ML storage to maintain a minimum of 24 hours supply in all parts of the delivery network.

We conclude that the project expenditure is prudent and partially efficient, noting that this finding is based on the assessment criteria have not been completely met. As discussed above Jacobs considers an efficient expenditure to be $2.90 million but recommends that it is reviewed again in the next Price Monitoring Investigation, especially if the expenditure value varies significantly to what has been approved at this time.

3.1.5 Low lift and high lift pump station

The project involves works on the current switchboards and pump motor controls due to aging infrastructure and the consolidation of the low lift pump station and high lift pump station at the Gladstone WTP into one pump station. The exact scope of works for the project is yet to be finalised.

Table 10 presents an overview of the findings of the prudency and efficiency of the project. From our analysis we conclude that the project is both **prudent** and **partially efficient** based on our Class 3 (+30%/-20%) cost estimate.

Table 10: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Low Lift and High Lift Pump Station Switchboard and Variable Speed Drives	Prudency		The project, as defined in single line diagram (SLD) 210-E-00151 revision B, is assessed as prudent as the primary driver of pump redundancy has been demonstrated through improved power supply distribution facilities. The requirement for the increase in capacity is in line with what is required to meet GAWB's understanding of Gladstone Council's likely increase in demand per annum for potable water.
	Efficiency		The project is assessed as efficient as the scope is appropriate for the assumed 20% demand growth. The standards of works are consistent with industry practice. However, the current cost estimates are based on the scope defined in SLD 210-E-00151 revision B, which includes VSDs for low lift pumps. SLD 210-E-00151 revision D shows the low lift pumps will be made redundant by larger high lift pumps. A revised cost estimate is required for the change in scope defined in SLD 210-E-00151 revision D. Hence we consider GAWB's costs to be efficient based on the costings for the project scope as defined in SLD 210-E-00151 revision B.

We consider that the efficient costs for the project are $5.09 million.

3.1.6 East End Reservoir - various works

The project involves various works at the East End Reservoir to rectify issues, including external concrete rectification, external strengthening and roof repairs and replacement, identified through a survey of the reservoir. The project has not been previously reviewed by the QCA.

From our analysis we conclude that the project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table 11**.**

Table 11: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
East End Reservoir - Various Works	Prudency		The project is assessed as prudent as the primary driver of renewal has been demonstrated through evidence of the deterioration of the existing infrastructure.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are anticipated to be consistent with industry practice given the standard or works implemented by GAWB that we have previously reviewed. An independent cost estimate has been developed for the works which is considered appropriate for the current phase of the project. We have reviewed the costs for undertaking the works and found them to be within the range our order of magnitude (+40%/-20%) benchmark cost estimates. We consider that the sole sourcing of reservoirs condition/risk assessment services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not market tested. However, we have not recommended a reduction in costs on this basis.

We conclude that the project expenditure is prudent and efficient. We consider an efficient expenditure to be $1.177 million for this capital project.

3.1.7 Dam safety compliance works

The project concerned involved the undertaking of various works on the Awoonga Dam primarily associated with safety of the dam wall and spillway structure to ensure compliance with regulatory requirements for dam safety. The project was not reviewed by the QCA in its 2010 price setting review. However, we note that the costs as presented to us for this project are higher than forecast in the 2010 QCA submission, primarily due to additional scope items.

From our analysis we conclude that the project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table 12.

Table 12: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Dam Safety Compliance Works	Prudency		The project is assessed as prudent as the primary driver of Compliance with legal obligation has been demonstrated through the requirement to meet the Dam Safety Management Guidelines for a referable dam under the *Water Supply (Safety & Reliability) Act*.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are considered to be consistent with industry practice. The majority of the costs associated with the principal contracts are consistent with prevailing market conditions. Variations have been well documented and approved following appropriate processes. However, we consider that the sole sourcing of project management and technical services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not market tested.

We consider an efficient expenditure to be $4.44 million for this capital project.

3.1.8 North Industrial Zone Potable Upgrade

The North Industrial Zone Potable Upgrade project involves increasing the capacity of the North Industrial Zone to meet demand commitments from customers currently served by the Yarwun Water Treatment Plant (YWTP). These demand commitments exceed the available capacity of the plant. It is proposed that the required increase in capacity to meet these commitments is achieved by installing a pipeline to connect the north industrial area with the Gladstone Water Treatment Plant (GWTP).

A related project, the Yarwun Water Treatment Plant (YWTP) upgrade, was reviewed by the QCA in 2010. This project was to upgrade the capacity of YWTP from 3.8 ML/d to 5 ML/d. It had a value of $2.59 million and the QCA report prepared at the time states that it was completed in 2008. This 2010 review concluded that the expenditure was appropriate and the QCA therefore proposed that the costs of the YWTP upgrade be included in the asset base.

From our analysis of the documentation provided we conclude that the North Industrial Zone Potable Upgrade project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table 9.

Table 13 : Summary of prudency and efficiency

Project	**Assessment**	**Outcome**	**Summary**
North Industrial Zone Potable Upgrade	Prudency		The project is assessed as prudent as the need for the project has been demonstrated; the YWTP is currently at, or beyond capacity, and a solution is required to maintain supply to customer in the North Industrial Zone.
	Efficiency		The project is assessed as efficient. The indirect cost allowances used in the GAWB cost estimate are high and we have recommended that GAWB reviews the establishment and mobilisation/demobilisation cost, which is based on 28% of the direct costs. However, the project costs are within +30% of our order of magnitude benchmark costs and are hence deemed efficient.

We consider that the efficient expenditure for this capital project is $6.65 million.

Table 14: Recommended adjustments to capital expenditure

Project	Project Expenditure ($'000)	Jacobs Assessed Efficient Expenditure ($'000)	Variance ($'000)
North Industrial Zone Potable Upgrade	6,649	6,649	0

3.2 Operating expenditure

3.2.1 Staffing - Operations and ALCM

As GAWB is both and owner and operator of assets, it requires administration, operating and maintenance staff in order to deliver its obligations to customers in the delivery of regulated services.

Table 15 presents an overview of the findings of the prudency and efficiency of the expenditure item Staff Costs, Operations which Jacobs find to be prudent and, from a material perspective, efficient. We also find the proposed Staff Cost for ALCM to be prudent but not efficient.

Table 15: Summary of Staffing prudency and efficiency

Opex	Assessment	Outcome	Summary
Staffing cost - Operations	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to supply the proper quality and quantity of water required by its customers and in accordance with the Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.
	Efficiency		Operations FTEs have increased from under 16 FTEs in 2010 to 23.5 FTEs in 2014. We are of the opinion that an increase in 7.2 FTEs only from the 2010 level is justified for operations based on the additional responsibilities and obligations of the organisation. This is due to the implementation of the DWQMP as well as the requirement for 24 hours 7 days operation at the WTPs. The difference between the number of FTEs we consider efficient and the number of FTEs proposed by GAWB, as being 0.3FTEs, is not considered material.
Staff cost - ALCM	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to properly maintain its infrastructure and supply the quality and quantity of water required by its customers and in accordance with the Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.
	Efficiency		ALCM FTEs have increased from 19 FTEs in 2010 to 35.5 FTEs in 2015. We are of the opinion that an additional 15.5 FTEs from the 2010 level is justified for ALCM based on the additional responsibilities and obligations of the organisation, resulting in efficient staffing of 34.5 FTEs in 2015. Separately, we recommend a resolution of the misclassification of a water treatment plant operator position. We accept non-routine bonus costs from 2016, but not the submitted additional non-routine item for an additional 0.5FTE for a portion of Curtis Island labour.

We recommend the adoption of the expenditures shown in Table 16.

Table 16: Jacobs' determined efficient operations staff opex

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Staffing cost – Operations - final	2,955	3,055	3,150	3,275	3,395
Staffing cost – ALCM – initial	3,791	3,924	4,062	4,215	4,376
Staffing cost – ALCM – final	3,821	3,955	4,094	4,249	4,410

3.2.2 Maintenance

Table 17 presents an overview of the findings of the prudency and efficiency of the expenditure item Maintenance, ALCM which we find to be both prudent and efficient.

Table 17: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Maintenance	Prudency		Core activity in the supply of bulk water. Proper maintenance of assets, programmes and systems are required to meet customer expectations and the Drinking Water Quality Management Plan.
	Efficiency		Maintenance capabilities are being improved resulting in a better understanding of the maintenance requirements of the network. Efficiencies should start to be realised when asset conditions and maintenance requirements are fully known.

We recommend the adoption of the maintenance expenditure shown in Table 18.

Table 18: Maintenance opex

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Recommended Maintenance Expenditure	2,308	2,259	2,795	2,470	2,821

3.2.3 Insurance

As an operator of a water utility it is necessary for GAWB to have in place various insurance policies as required by law and as dictated by good business practice.

Table 19 presents an overview of the findings of the prudency and efficiency of GAWB's expenditure on insurance which we find to be both prudent and efficient.

Table 19: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Insurance	Prudency		GAWB faces some risks of events occurring beyond its control which may result in losses that would threaten is business viability. Obtaining insurance for such events is prudent.
	Efficiency		The insurance contracts obtained by GAWB were market tested and were subject to the competitive quotation process. Whilst we find that GAWB's proposed insurance expenditure is efficient we recommend that the expenditure is reduced to reflect a lower escalation rate over the regulatory period.

We recommend the adoption of the insurance expenditure shown in Table 20.

Table 20: Recommended insurance expenditure

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Recommended Insurance Expenditure	754	792	832	873	917

3.2.4 Motor vehicles

As GAWB both owns and operates water utility infrastructure and as some of this infrastructure is in remote locations and not always served by metalled roads, it is necessary for GAWB to own motor vehicles, including 4WD vehicles and 'Utes'. Table 21 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table 21: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Motor Vehicles	Prudency		Motor vehicles fit for purpose are required due to the extent and terrain in which GAWB operates
	Efficiency		Acquisition of Toyota Camry is unnecessary although any savings are minor due to the need to source alternative transport (taxis) when there is a co-incident requirement for two vehicles. Proposed fuel costs are not consistent with prevailing market conditions.

We recommend the adoption of the motor vehicle expenditure shown in Table 22.

Table 22: Motor vehicles revised opex

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Recommended Motor Vehicle Expenditure	743	761	780	800	820

3.2.5 Electricity

GAWB is required to use electricity to operate its various facilities and offices. We understand that GAWB, where operations allow, uses off-peak electricity for pumping purposes. GAWB has four sites that are 'contestable' that it is can contract for electricity supplies from any licenced electricity retailer in Australia. The remainder of its sites, representing less than 10% of energy use by consumption are on Ergon Energy Ltd tariffs. We have reviewed the consumption patterns and electricity tariffs for the four contestable sites.

Table 23 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table 23: Summary of prudency and efficiency

Expenditure	Assessment	Outcome	Summary
Electricity	Prudency		Electricity is required for the pumping and treatment of water and the volume of energy used is dependent on demand for water. The cost of electricity is dependent on the time of use and the maximum demand.
	Efficiency		The expenditure is assessed as partially efficient under the current operating constraints as we consider that the escalators applied by GAWB are inconsistent with recent AER draft determinations and Ergon Energy's pricing submission to the AER. We also expect that risk management measures could be implemented to limit adverse electricity market price movements which will lead to lower electricity prices in base year prices as well as prices in subsequent years. We further expect that efficiencies in the use and cost of electricity can readily be achieved once the operating constraints that GAWB faces are relaxed by various capital works initiatives e.g. installation of VSDs limiting peak demand charges and installation of higher pumping capacity at GWTP allowing greater off-peak pumping.

We recommend the expenditure for electricity as shown in Table 24.

Table 24: Recommended electricity expenditure

Recommended	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Electricity expenditure	2,198	2,263	2,381	2,462	2,548

3.2.6 Chemicals

As an operator of a water supply utility, both raw water and potable water, GAWB requires to use chemicals in the treatment of its raw water and in the dosing of its potable water in order to comply with the Water Supply (Safety and Reliability) Act 2008.

Table 25 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table 25: Summary of prudency and efficiency

Expenditure	Assessment	Outcome	Summary
Chemical expenditure	Prudency		Chemicals are required in the treatment of water and the quantity used is dependent on demand and the quality of the raw water.
	Efficiency		Whilst the forecast usage levels of chemicals are higher than average historical usage levels, the forecast usage is below peak usage. The higher than average forecast will provide a margin in the event that chemical usage increases due to a deterioration in source water quality.

We recommend the revised expenditure for chemicals shown in Table 26.

Table 26: Recommended chemical expenditure

Recommended	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Chemical expenditure	827	849	872	896	920

4. Summary of prudency and efficiency assessments

A summary of the findings of our prudency and efficiency review are presented in the table below.

Table 27: Capital expenditure assessment summary

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Awoonga Dam	8,992 (QCA originally advised 8,307)	Regulatory	Prudency		The project is assessed as prudent as the primary driver of Compliance has been demonstrated through the requirement to the AFC Guidelines.	8,992	8,992	0
			Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are consistent with industry practice. The costs associated with the principal contract are consistent with prevailing market conditions. We note that the contract management services and consulting engineering services were sole soured, so hence may not have been efficient. However, we do not recommend any specific cost reductions as it is not practicable to determine with any degree of substantiation the difference between actual costs and market (i.e. efficient costs) had these services been put out to tender.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Offline Storage & Repump Station	21,106	Risk	Prudency		The project does not strictly meet the primary driver (as per the QCA TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' as the project has not been explicitly endorsed by customers. However, Jacobs concurs that there is a need for GAWB to undertake condition assessment and maintenance on critical assets and note that this links to the good practice clause in customer contracts. As such, we find the need for expenditure to be prudent albeit that, regulatory approval under this driver requires customer endorsement.	13,072	13,072	-8,034

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
			Efficiency		Regulatory efficiency is a two-part test: 1. Firstly whether the regulated entity's preferred option reflects the least cost in terms of the total of capex and opex over the life of the asset whilst providing the greatest utility in terms of the regulatory driver. Therefore, when comparing options with different asset lives we consider the life cycle (or NPV) cost of the various options over the period of the longest life option, together with the extent to which each option delivers on the regulatory driver. [An exception to this is when the regulatory driver has a shorter life than one of the options, in which case the comparison of life cycle costs is limited to the duration of that driver.] 2. Secondly, whether the costs proposed by the entity for its preferred option are the costs that would be incurred by a knowledgeable and efficient operator. In view of the two part test, we consider: 1. That the life of the regulatory driver is not relevant (or limited) in this case. Therefore, the option with the least cost NPV over the life of the longest-life asset that delivers the highest utility per unit of cost will be preferred.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
					We note GAWB's submission that the NPV costs of our preferred technical solution (Pontoon Pump Station) and theirs (Offline Storage) are sufficiently similar to disqualify cost as the deciding factor. The basis of this NPV comparison has not been provided. We note that our solution delivers more days of storage than the Offline Storage and therefore greater utility. GAWB has submitted a list of maintenance activities that could take over 14 days to undertake, which would not be possible to achieve using the Offline Storage option. In addition, access to a greater storage could allow for several maintenance activities to be undertaken concurrently during the same shut down period resulting in efficiencies; and to provide a larger buffer for unforeseen eventualities. 2. In summary, our solution is efficient on this first criterion. By comparison, on the first test, GAWB's preferred solution may deliver less utility for a higher life cycle cost, making it inefficient. On the second test, we consider that GAWB is a knowledgeable and efficient operator and that, all things being equal, the proposed cost of its preferred solution is efficient, as are our costs. Our option is efficient on both criteria. GAWB's option is partially efficient as it arguably fails the first test.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
South Trees Pipe Bridge	1,685	Risk	Prudency		The project is assessed as prudent as the primary driver of risk mitigation, which we map onto the QCA regulatory driver of replacement (refurbishment) has been demonstrated. The condition assessment found that the pipe bridge is suffering various forms of corrosion with the risk assessed as 'high'. The project meets the QCA's definition of prudency as it is required as a result of renewal of existing infrastructure, which is in use and useful (i.e. it is required to deliver a regulated service).	1,685	1,685	0
			Efficiency		The project is assessed as efficient. The scope of works is appropriate. An independent cost estimate has been developed on GAWB's behalf for the works which is considered appropriate for the current phase of the project. We have undertaken a high level review of the costs and found them to be within our benchmark order of magnitude cost estimates.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Boat Creek Expansion	3,986	Risk	Prudency		The project is assessed as prudent. The need for the project has been demonstrated; the increase of storage at Boat Creek reservoir is necessary to meet GAWB's internal objective to maintain a minimum of 24 hours supply in all parts of the delivery network. However, the primary driver (as per the QCA TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' has not been demonstrated. We strongly recommend that GAWB seeks and obtains written customer approval for this project prior to proceeding to create a direct link to the regulatory driver.	2,899	2,899	-1,087
			Efficiency		The project is assessed as partially efficient. The methodology used for the selection of the preferred option is not robust and as such appropriateness of the scope of the preferred option has not been demonstrated. As the costs have been based on a storage size larger than required, the costs currently included in the budget are excessive and hence are considered by us to be not efficient. In our recommended costs we have allowed for 10 ML storage to maintain a minimum of 24 hours supply in all parts of the delivery network.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Low Lift & High Lift Pump Station	5,087	Replacement	Prudency		The project, as defined in single line diagram (SLD) 210-E-00151 revision B, is assessed as prudent as the primary driver of pump redundancy has been demonstrated through improved power supply distribution facilities. The requirement for the increase in capacity is in line with what is required to meet GAWB's understanding of Gladstone Council's likely increase in demand per annum for potable water.	5,087	5,087	0
			Efficiency		The project is assessed as efficient as the scope is appropriate for the assumed 20% demand growth. The standards of works are consistent with industry practice. However, the current cost estimates are based on the scope defined in SLD 210-E-00151 revision B, which includes VSDs for low lift pumps. SLD 210-E-00151 revision D shows the low lift pumps will be made redundant by larger high lift pumps. A revised cost estimate is required for the change in scope defined in SLD 210-E-00151 revision D. Hence we consider GAWB's costs to be efficient based on the costings for the project scope as defined in SLD 210-E-00151 revision B.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
East End Reservoir	1,177	Replacement	Prudency	●	The project is assessed as prudent as the primary driver of renewal has been demonstrated through evidence of the deterioration of the existing infrastructure.	1,177	1,177	0
			Efficiency	●	The project is assessed as efficient. The scope is appropriate and the standards of works are anticipated to be consistent with industry practice given the standard or works implemented by GAWB that we have previously reviewed. An independent cost estimate has been developed for the works which is considered appropriate for the current phase of the project. We have reviewed the costs for undertaking the works and found them to be within the range our order of magnitude (+40%/-20%) benchmark cost estimates. We consider that the sole sourcing of reservoirs condition/risk assessment services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not market tested. However, we have not recommended a reduction in costs on this basis.			

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
Dam Safety Compliance Works	4,444	Past	Prudency		The project is assessed as prudent as the primary driver of Compliance has been demonstrated through the requirement to meet the Dam Safety Management Guidelines for a referable dam under the Water Supply (Safety & Reliability) Act.	4,444	4,444	0
			Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are anticipated to be consistent with industry practice. The majority of the costs associated with the principal contracts are consistent with prevailing market conditions. Variations have been well documented and approved following appropriate processes. However, we consider that the sole sourcing of project management and technical services may not have resulted in efficient costs.			
North Industrial Zone Potable Upgrade	6,649	Growth	Prudency		The project is assessed as prudent as the need for the project has been demonstrated; the YWTP is currently at, or beyond capacity, and a solution is required to maintain supply to customer in the North Industrial Zone.	5,663	6,649	0

Project	GAWB Project Expenditure $('000)	Driver	Assessment	Outcome	Summary	Jacobs Benchmark Cost Estimate $('000)^	Jacobs Assessment of Efficient Expenditure $('000)	Variance Jacobs Efficient Less GAWB $('000)
			Efficiency		The project is assessed as efficient. The indirect cost allowances used in the GAWB cost estimate are high and we have recommended that GAWB reviews the establishment and mobilisation/demobilisation cost, which is based on 28% of the direct costs. However, the project costs are within +30% of our order of magnitude benchmark costs and are hence deemed efficient.			

^ Jacobs Recommended Expenditure is derived from our assessment of efficiency. For those projects determined not to be prudent we consider the efficient expenditure to be considered by the QCA to be $0.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient).

Table 28: Operating expenditure assessment summary

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
Staffing costs, operations		2,863	2,970	3,061	3,162	3,272	3,397	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to supply the quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.	2,955	3,055	3,159	3,275	3,395
								Efficiency		Operations FTEs have increased from under 16 FTEs in 2010 to 23.5 FTEs in 2014. We are of the opinion that an increase of 7.2 FTEs only from the 2010 level is justified for operations based on the additional responsibilities and obligations of the organisation. This is due to the implementation of the DWQMP as well as the requirement for 24 hours 7 days operation at the WTPs. The difference between the number of FTEs we consider efficient and the number of FTEs proposed by GAWB, as being 0.3FTEs, is not material.					

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
Staffing costs: ALCM	3,769		3,970	4,093	4,229	4,377	4,546	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to properly maintain its infrastructure and supply the quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.	3,791	3,924	4,062	4,215	4,376
								Efficiency		ALCM FTEs have increased from 19 FTEs in 2010 to 35.5 FTEs in 2015. We are of the opinion that an additional 15.5 FTEs from the 2010 level is justified for ALCM based on the additional responsibilities and obligations of the organisation. We recommend resolution of the misclassification of a water treatment plant operator.					
Maintenance	2,174		2,308	2,257	2,790	2,463	2,810	Prudency		Core activity in the supply of bulk water. Proper maintenance of assets, programmes and systems are required to meet customer expectations and the Drinking Water Quality Management Plan.	2,308	2,259	2,795	2,470	2,821
								Efficiency		Maintenance capabilities are being improved resulting in a better understanding of the maintenance requirements of the network. Efficiencies should start to be realised when asset conditions and maintenance requirements are fully known.					

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
Insurance	736		772	810	850	892	936	Prudency		GAWB faces some risks of events occurring beyond its control which may result in losses that would threaten is business viability. Obtaining insurance for such events is prudent.	754	792	832	873	917
								Efficiency		The insurance contracts obtained by GAWB were market tested and were subject to the competitive quotation process. Whilst we find that GAWB's proposed insurance expenditure is efficient we recommend that the expenditure be reduced to reflect a lower escalation rate in the first year of the regulatory period.					
Motor Vehicles	750		767	786	806	826	847	Prudency		Motor vehicles fit for purpose are required due to the extent and terrain in which GAWB operates	743	761	780	800	820
								Efficiency		Acquisition of the Toyota Camry is unnecessary although any savings are minor due to the need to source alternative transport when there is a co-incident requirement for two vehicles. Fuel costs are not consistent with market conditions.					
Electricity		1,991	2,186	2,401	2,631	2,796	2,971	Prudency		Electricity is required for the pumping and treatment of water; consumption is dependent on water demand. The cost of electricity is dependent on the time of use and the maximum demand.	2,198	2,263	2,381	2,462	2,548

Opex	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Assessment	Outcome	Summary	Jacobs Proposed Operating Expenditure ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20				2015-16	2016-17	2017-18	2018-19	2019-20
								Efficiency		The expenditure is assessed as partially efficient under the current operating constraints as we consider that the escalators applied by GAWB are inconsistent with recent AER draft determinations and Ergon Energy's pricing submission to the AER. We also expect that risk management measures could be implemented to limit adverse electricity market price movements which will lead to lower electricity prices in base year prices as well as prices in subsequent years. We further expect that efficiencies in the use and cost of electricity can readily be achieved once the operating constraints that GAWB faces are relaxed by various capital works initiatives e.g. installation of VSDs limiting peak demand charges and installation of higher pumping capacity at GWTP allowing greater off-peak pumping.					
Chemicals		808	828	849	870	892	914	Prudency		Chemicals are required in the treatment of water and the quantity used is dependent on demand and the quality of the raw water.	827	849	872	896	920
								Efficiency		Whilst the forecast usage levels of chemicals are higher than average historical usage levels, the forecast usage is below peak usage. The higher than average forecast will provide a margin in the event that chemical usage increases due to a deterioration in source water quality.					

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

4.1 Common themes

In this subsection, we document a number of common themes in respect of areas for possible improvement with respect to GAWB's procedures for identifying, selecting and implementing capital projects and with respects to setting operational expenditure budgets.

4.1.1 Capital expenditure common themes

We have reviewed eight capital projects and programs against the QCA's definitions of prudency and efficiency. From this review, we have noted a number of common themes, which are discussed in the following sections.

Customers' willingness to pay

The QCA's definition of prudency includes projects that achieve an increase in the reliability or the quality of supply that is explicitly endorsed or desired by customers or external agencies. We understand that GAWB tests their customers' willingness to pay through their *2015 Price Monitoring Investigation Submission*. In addition, we understand that projects do not become official until they are endorsed by its customers. Whilst we agree there are efficiencies using the submission for dual purposes (to inform both the regulator and customers) there may be difficulties due to the timing of this document. For example, there are two projects Offline Storage & Repump Station and Boat Creek Expansion) that have progressed to detailed design without prudency being established or appropriate documentation being developed (e.g. business cases). We consider that this results in the potential for rework and/or nugatory work to be undertaken should customers not accept the proposed solution.

In addition, GAWB considers no negative responses to the *2015 Price Monitoring Investigation Submission* to be an acceptance of the customers' willingness to pay. We do not concur with GAWB on this matter as silence should not, as a general principle, be capable of being taken as implicit approval.

Sole sourcing

Within most projects reviewed, we have seen some evidence of sole sourcing. This does not appear to meet with the requirements of GAWB's procurement policy as outlined in its submission. In many cases there is a documented reason for this decision (for example, perceived unique skill sets, relationship, prior experience). In addition, we note the context in which some of these decisions were made, i.e. a lack of skills/resources in Gladstone due to competing demands from industry. However, by not undertaking market testing, it is difficult for GAWB to demonstrate that the costs achieved through these contracts were efficient.

Risk mitigation

We have reviewed two projects (Offline Storage & Repump Station and Boat Creek Expansion) where GAWB has proposed to mitigate risk by increasing storage capacity within its network. For the Offline Storage & Repump Station Project, the sizing of the storage has been designed to mitigate even low risk events. We have not seen any evidence of GAWB discussing customer driven options to reduce costs, for example, opportunities for customers to increase on site storage to prevent additional storage being required within GAWB's network. However, we recognise that water is critical for many of GAWB's industrial customers and that a lack of water, even for short times, would have significant economic consequences. In addition, we are aware that the demands of GAWB's customers can be varying, unlike typical residential demands, as water is required to meet process needs. As such, this reasonably influences GAWB's approach to risk mitigation.

4.1.2 Operating expenditure common themes

In our review of GAWB's proposed operating expenditure and operating expenditure budgeting process, we found no systemic themes that would lead us to the conclusion that a specific bias in the establishment of operating expenditure budgets exists.

5. Cost escalators

Our review of GAWB's proposed cost escalation rates examined the rates proposed by GAWB for appropriateness. Where alternative escalation rates were available and likely to be more appropriate, these are recommended. Table 29 summarises GAWB's proposed rates and our recommended rates. All years are financial years unless otherwise stated (e.g. 2016 means FY2015-16).

Table 29: Comparison of GAWB's proposed and Jacobs' recommended escalation rates

Cost category	GAWB proposal	Jacobs recommendation	Change
Staffing costs	2016: 3.29% 2017: 3.13% 2018: 3.38% 2019: 3.61% 2020: 3.97% (Average: 3.5%)	2016: 3.3% 2017: 3.5% 2018: 3.5% 2019: 3.8% 2020: 3.8% (Average: 3.6%)	↔ ↑ ↑ ↑ ↓
Electricity	2016: 9.83% 2017: 9.82% 2018: 9.60% 2019: 6.25% 2020: 6.25% (Average: 8.4%)	2016: 3.5% 2017: 6.1% 2018: 4.2% 2019: 4.2% 2020: 4.2% [Average: 4.4%]	↓ ↓ ↓ ↓ ↓
Maintenance	2.5%	2.6%	↑
Chemicals	2.5%	2.7%	↑
Other expenditure	2.5%	2.5%	↔
Professional services	3.4%	1.8%	↓
Insurance	2016: 5.0% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 5.0%)	2016: 2.5% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 4.5%)	↓ ↔ ↔ ↔ ↔
Regulatory fees	5.8%	Not proposed*	**n.a.**
Council rates	2.6%	5.0%	↑
All Capex items	2.5%	CPI[2]	↔

Note: * The purpose of the regulatory fees is to recover fixed regulatory costs, incurred predominantly by the QCA in 2015. This is more akin to an annuity. Therefore, we consider reasonable any approach that recovers the efficient regulatory costs, in real terms, over the regulatory period.

As an example of how to use this chapter, the escalation rate for GAWB's staffing costs in 2016 (first row of Table 29) represents the escalation rate applied to staffing costs in 2015 to obtain the staffing-costs in 2016.

[2] Whilst we refer to CPI as being the escalation rate, the technically accurate description is 'percentage changes in the CPI'. We have adopted the term 'CPI' instead of 'percentage changes in the CPI' for brevity.

Impact of key findings

- For the largest cost category of staffing costs, which represents 47% of GAWB's proposed total opex during 2016-20, our slightly higher recommended escalation rates (on average) will not have a material impact over the regulatory period.
- For the second largest cost category of electricity costs, which represents 10.8% of GAWB's proposed total opex during 2016-20, our lower recommended escalation rates (on average) may have a material impact on total electricity costs over the regulatory period. However, we consider that there are electricity cost savings available to GAWB in the market and that it would be in the best interests of GAWB and its customers for GAWB to pursue those opportunities.
- We have recommended minor increases to the escalation rates for maintenance, chemicals and council rates, which will result in immaterially higher opex in those categories, ceteris paribus, than GAWB has proposed.
- On the other hand, we have recommended decreases to the escalation rates for professional services and insurance costs, which will result in immaterially lower opex in those categories, ceteris paribus, than GAWB has proposed.
- Overall, GAWB's escalation rates are reasonable. Our differences generally relate to more up-to-date data being available to us at the time we prepared this report (i.e. GAWB prepared its submissions some months earlier than our report) or a difference of economic opinion in an area of uncertainty. In some cases GAWB has proposed to follow regulatory precedent, where we have examined the situation more broadly. Whilst our analysis has led us to recommend alternative rates, on the basis that they are more likely to be appropriate, we consider that GAWB's proposed rates were put forward in good faith. We have found no evidence to suggest that GAWB was seeking to exercise monopoly power.
- We consider that GAWB has appropriately applied its recommended escalation rates in its budget spreadsheets. However, it is outside our scope to review the application of escalation rates within GAWB pricing model.

6. GAWB cost allocation review

For its 2010 review, QCA GAWB's operating costs were allocated in the following categories

- Operations
- Maintenance
- Chemicals
- Electricity
- Other
- Staffing
- Insurance
- Rates

During the 2010-15 regulatory period, GAWB made the decision that its operating expenditure should be captured in a way that better reflects the way its business is operated. The new allocation method seeks to allocate cost by business function as opposed to activity which was the basis of the previous allocation method.

GAWB is of the opinion that the new approach will better support a more robust decision-making processes internally and provide greater transparency over GAWB's costs structure and related pricing model. The new functional reporting format is structured around four functional areas:

- Operations
- Asset life cycle management
- Strategy and asset creation
- Corporate services

These functions, based on the current organisational structure, overlap cost centres necessitating the development of a process to allocate costs to the functional areas. To ensure that the cost translation process from the original allocation to the new format was carried out consistently, a series of translation rules were defined. These are shown in Table 30.

Table 30: Functional definition

Function	Definition
Operations	The Operations function includes activities and inputs required to produce or provide a product. Activities include: • Storage • Delivery • Treatment • Hatchery
Asset life cycle management	The Asset Life Cycle Management function encompasses activities involved in managing and maintaining existing assets. Activities include: • Maintenance planning and execution • Condition assessments • Land management • Easement maintenance • Recreation area management • Maintenance of corporate assets ALCM costs include holding costs such as insurance and local government rates.

Function	Definition
Strategy and asset creation	The Strategy function includes activities necessary to meet strategic business positioning and corporate governance requirements while Asset Creation involves activities to develop and deliver GAWB's capital expenditure program. Activities include: • Board and CEO • Strategic planning • Economic regulation • New customer/business development • Pre-feasibility, scoping and planning • Non-capital creation and acquisition costs
Corporate services	The Corporate Support Services function entails activities that are required to support the functions and operations of the other activities (and cannot be directly allocated to a function). Activities include: • Finance • Procurement • HR • ICT • Legal • Provision of corporate facilities (excluding maintenance) • Other administration/reception

While most costs recorded in GAWB's general ledger could be readily allocated to the function for which they have been incurred, e.g. all chemicals and electricity are used in Operations; some costs required a more subjective assessment of the appropriate allocation. The employment costs of some employees fall into this allocation uncertainty area, e.g. the total employment cost of the Operations and Maintenance Manager. Costs such as this were allocated based on the individual's and management's assessment of the effort spent working on activities attributable to the functional area. While this subjective allocation method may be less than ideal (albeit drawing on experience and judgement from those directly concerned), for a small organisation like GAWB this is considered by us to be appropriate as the cost of a more rigorous allocation method (e.g. based on timesheet or an activity based costing study) is likely to outweigh any benefits arising from a more accurate allocation method.

To test the consistency of its new cost allocation methodology, GAWB applied the cost definition rules to the 2010 QCA approved operation expenditure. Table 31 provides the summary of the QCA's 2010 final approved operating expenditure based on the previous and current allocation methods. It shows that the costs approved by the QCA for the 2010-2015 period based on the cost categories applied in the 2010 review has been translated to the new functional areas.

It also shows the actual expenditure incurred over the 2010-2015 period based on the current allocation method. Ideally, the comparison should also include an allocation of the actual costs incurred over the 2010-2015 period based on the previous allocation method. However GAWB was unable to provide this as such an allocation was not undertaken at the time the data was captured as it served no functional purpose for the organisation.

Table 31: Cost allocation comparison

QCA Approved ($'000)	2011	2012	2013	2014	2015
Previous cost categories					
Operations	$1,409	$1,223	$1,070	$1,060	$1,093
Maintenance	$2,450	$2,107	$1,860	$2,428	$2,331
Chemicals	$847	$885	$925	$967	$1,011
Electricity	$1,286	$1,350	$1,476	$1,616	$1,768

QCA Approved ($'000)	2011	2012	2013	2014	2015
Other	$2,150	$2,119	$2,096	$2,412	$2,586
Staffing	$5,878	$6,028	$6,222	$6,528	$6,849
Insurance	$696	$731	$767	$786	$805
Rates	$336	$354	$373	$392	$413
Sub-Total	**$15,052**	**$14,797**	**$14,789**	**$16,189**	**$16,856**
Cost pass through - Increase in QCA fees	$268	$288	$308	$330	$353
Total	**$15,320**	**$15,085**	**$15,097**	**$16,519**	**$17,209**
Current functional areas					
Operations	$4,870	$4,929	$5,077	$5,307	$5,618
Asset Life Cycle Management	$5,737	$5,406	$5,302	$5,989	$6,047
Strategy & Asset Creation	$3,070	$3,051	$3,023	$3,502	$3,660
Operations	$1,643	$1,699	$1,695	$1,721	$1,884
Total	**$15,320**	**$15,085**	**$15,097**	**$16,519**	**$17,209**
Actuals ($'000) [3]					
Operations	$5,021	$5,706	$6,580	$6,918	$6,838
Asset Life Cycle Management	$6,267	$7,639	$7,445	$9,126	$8,566
Strategy & Asset Creation	$2,762	$3,641	$3,672	$3,793	$3,661
Corporate Services	$1,907	$1,748	$1,729	$1,700	$1,832
Total	**$15,957**	**$18,734**	**$19,426**	**$21,537**	**$20,897**

GAWB engaged PricewaterhouseCoopers (PwC) to review and audit the appropriateness of the functional reporting definitions and rationale, and to conduct a quality assurance check over the translation into the new functional definitions. In their review, PwC recommended the merger of two functional areas (Strategy and Asset Creation). Further PwC's quality assurance checks performed over the translation of GAWB's cost base into the four functional areas did not highlight any exceptions. The report concluded that "*to the extent that (PwC* was) *able to validate the calculations against source documentation, the translation rules applied to 2010 QCA Price Review Forecast and subsequent yearly cost baselines, appear to have been accurately and consistently applied in accordance with the proposed functional allocation methodology*."

PwC also indicated that "*methodology papers, including key assumptions, and other documentation reviewed clearly outlined the cost allocation process undertaken at GAWB and respective reconciliation to source data*". PwC noted that "*additional information was readily available to support the QCA efficiencies and further reallocation of General Ledger amounts into functional categories. Generally, GAWB work papers were clear, complete and included additional commentary for ease of reference. Data integrity checks have been embedded throughout the calculation worksheets to ensure accuracy. PwC could also easily trace the changes applied to convert the initial cost allocation from five functions into the final four categories."*

PwC stated that *"satisfactory explanations were also provided for the adjustments applied to transfer costs between functional categories to better align with the functional definitions."*

[3] 2015 figures are estimates.

6.1 Documentation reviewed

The key reference documents used for this review are:

- *PwC, Functional Cost Allocation Review, Final report*, 28 August 2014 (Appendix H of GAWB, 2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority, Appendices Volume Two, September 2014)
- GAWB, Cost Allocation Methodology paper provided by GAWB
- Functional Reporting Translation Approach – 2010 Price Review forecast , paper provided by GAWB
- EDOCS_n286610_v1_Functional_opex_split_2011_to_2013_-_March_2014_pdf
- Compare functional splits original vs revised AO 3.11.2014 2011 to 2013.xlsx

6.2 Jacobs assessment and conclusions

Our assessment reviews of the PwC and GAWB papers discussing the translation of GAWB's cost base into the four functional definitions did not reveal any areas of concern. We concur with PwC that the translation rules set by GAWB for the various cost items based on its General Ledger entries have been applied consistently. Based on the 2011 to 2013 years' data provided by GAWB to us, the costs have been applied in accordance with their functional allocation method. While individual cost items have exhibited significant annual movements e.g. relocation expenses increased over 10 fold in 2013, this was seen across all similar categories in the functional areas while other increases were due to the requirements of certain expenditure items in given functional areas e.g. legal assistance and insurance claims for operations. The large annual cost movements for individual cost items are in our opinion not unusual and their allocation has been treated consistently across the years and functional areas. The cost allocation of individual cost items over the 2011 to 2013 period is detailed in Attachment K.1 of Appendix K.

From the above and from our analysis of the data we therefore conclude that the new cost allocation method is robust and, because the cost items as well as functional area costs are captured consistently, the process is able to be reconciled and compared with costs incurred in previous years and their allocation.

7. Overall conclusions

7.1 Capital expenditure

For the eight sampled capital expenditure projects reviewed in detail, we have found the following projects to be prudent and efficient:

- Awoonga Dam
- South Trees Pipe Bridge
- Low Lift and High Lift Pump Station
- East End Reservoir
- Dam Safety Compliance Works
- North Industrial Zone Potable Upgrade

We have found the following projects to be prudent and partially efficient:

- Boat Creek expansion
- Offline Storage and Repump Station

7.1.1 Recommended adjustments to capital expenditure

As a result of our analysis, our recommended efficient costs and their variance with GAWB's proposed capital expenditure for existing and future projects Table 32 below.

Table 32: Recommended adjustments to capital expenditure

Project	GAWB Project Expenditure ($'000)	Jacobs Assessed Efficient Expenditure ($'000)	Variance Jacobs Efficient Less GAWB ($'000)
Awoonga Dam - Spillway Capacity Upgrade (implementation)	8,992	8,992	0
Offline Storage & Repump Station	21,106	13,072	-8,034
South Trees Pipe Bridge Structural Refurbishment	1,685	1,685	0
Boat Creek Expansion	3,986	2,899	-1,087
Low Lift & High Lift Pump Station Switchboard & Variable Speed Drives	5,087	5,087	0
East End Reservoir - Various Works	1,177	1,177	0
Dam Safety Compliance Works	4,444	4,444	0
North Industrial Zone Potable Upgrade	6,649	6,649	0
Total	**53,126**	**44,005**	**-9,121**

7.2 Operating expenditure

For the seven sampled operating expenditure items reviewed in detail, we have found the following expenditure items to be prudent and efficient:

- Staffing Costs, Operations
- Maintenance
- Insurance
- Chemicals

We have found the following operating expenditure items to be prudent and partially efficient:

- Staffing Costs, Maintenance, ALCM
- Motor Vehicles
- Electricity

We have found no operating expenditure items that are neither prudent nor efficient.

7.2.1 Recommended adjustments to operating expenditure

Our recommended adjustments to operating expenditure are set out in Table 33 below:

Table 33: Recommended adjustments to operating expenditure

Operating expenditure category	2014-2015 Expenditure ($'000)		GAWB Forecast Operating Expenditure ($'000)					Jacobs' Proposed Operating Expenditure ($'000)					Variance (GAWB-Jacobs) ($'000)				
	ALCM	Operations	2015-16	2016-17	2017-18	2018-19	2019-20	2015-16	2016-17	2017-18	2018-19	2019-20	2015-16	2016-17	2017-18	2018-19	2019-20
Staffing, operations		2,863	2,970	3,061	3,162	3,272	3,397	2,955	3,055	3,159	3,275	3,395	15	6	3	-3	2
Staffing, ALCM	3,769		3,970	4,093	4,229	4,377	4,546	3,791	3,924	4,062	4,215	4,376	179	169	167	162	170
Maintenance	2,174		2,308	2,257	2,790	2,463	2,810	2,308	2,259	2,795	2,470	2,821	0	-2	-5	-7	-11
Insurance	736		772	810	850	892	936	754	792	832	873	917	18	18	18	19	19
Motor Vehicles	750		767	786	806	826	847	743	761	780	800	820	24	25	26	26	27
Electricity		1,991	2,186	2,401	2,631	2,796	2,971	2,198	2,263	2,381	2,462	2,548	-12	138	250	334	423
Chemicals		808	828	849	870	892	914	827	849	872	896	920	1	0	-2	-4	-6
Total	**7,429**	**5,662**	**13,801**	**14,257**	**15,338**	**15,518**	**16,421**	**13,576**	**13,903**	**14,872**	**14,991**	**15,797**	**225**	**354**	**466**	**527**	**624**

7.3 Review of GAWB's escalators

The key findings from our review of GAWB's escalation rates are as follows:

- For the largest cost category of staffing costs, which represents 47% of GAWB's proposed total opex during 2016-20, our slightly higher recommended escalation rates (on average) will not have a material impact over the regulatory period.
- For the second largest cost category of electricity costs, which represents 10.8% of GAWB's proposed total opex during 2016-20, our lower recommended escalation rates (on average) may have a material impact on total electricity costs over the regulatory period. However, we consider that there are electricity cost savings available to GAWB in the market and that it would be in the best interests of GAWB and its customers for GAWB to pursue those opportunities.
- We have recommended minor increases to the escalation rates for maintenance, chemicals and council rates, which will result in immaterially higher opex in those categories, ceteris paribus, than GAWB has proposed.
- On the other hand, we have recommended decreases to the escalation rates for professional services and insurance costs, which will result in immaterially lower opex in those categories, ceteris paribus, than GAWB has proposed.
- Overall, GAWB's escalation rates are reasonable. Our differences generally relate to more up-to-date data being available to us at the time we prepared this report (i.e. GAWB prepared its submissions some months earlier than our report) or a difference of economic opinion in an area of uncertainty. In some cases GAWB has proposed to follow regulatory precedent, where we have examined the situation more broadly. Whilst our analysis has led us to recommend alternative rates, on the basis that they are more likely to be appropriate, we consider that GAWB's proposed rates were put forward in good faith. We have found no evidence to suggest that GAWB was seeking to exercise monopoly power.
- We consider that GAWB has appropriately applied its recommended escalation rates in its budget spreadsheets. However, it is outside our scope to review the application of escalation rates within GAWB pricing model.

7.4 Cost allocation review

Our review of the PwC and GAWB papers discussing the translation of GAWB's cost base into the four functional definitions did not reveal any areas of concern. We concur with PwC that the translation rules set by GAWB for the various cost items based on its General Ledger entries have been applied consistently. Based on the 2011 to 2013 years' data provided by GAWB to us, the costs have been applied in accordance with their functional allocation method. While individual cost items have exhibited significant annual movements e.g. relocation expenses increased over 10 fold in 2013, this was seen across all similar categories in the functional areas while other increases were due to the requirements of certain expenditure items in given functional areas e.g. legal assistance and insurance claims for operations. The large annual cost movements for individual cost items are in our opinion not unusual and their allocation has been treated consistently across the years and functional areas.

From the above and from our analysis of the data we therefore conclude that the new cost allocation method is robust and, because the cost items as well as functional area costs are captured consistently, the process is able to be reconciled and compared with costs incurred in previous years and their allocation.

Appendix A. Awoonga Dam Spillway Capacity Upgrade – Implementation

A.1 Executive summary

The project involves the raising of Saddle Dam 3, the raising of the Awoonga Dam left abutment and the construction of an auxiliary spillway channel below Saddle Dam 6. These works are required to meet acceptable flood capacity (AFC) requirements as issued by DERM (now DEWS). The project is currently being implemented with completion anticipated in October 2015.

The project was previously reviewed by the QCA in the 2010. This 2010 review concluded that significant expenditure is required to meet dam safety standards within the next regulatory period and approved an indicative cost estimate of $22 million. Subsequently, further investigations have been undertaken by GAWB and its consultants to confirm the scope of works. This has resulted in a reduction in projected capex of $13 million. At the time of writing the forecast capital expenditure is $9 million.

From our analysis we conclude that the project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table A.1.

Table A.1: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Awoonga Dam Spillway Capacity Upgrade	Prudency		The project is assessed as prudent as the primary driver of Compliance has been demonstrated through the requirement to the Acceptable Flood Capacity (AFC) Guidelines.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are consistent with industry practice. The costs associated with the principal contract are consistent with prevailing market conditions. We note that the contract management services and consulting engineering services were sole soured, so hence may not have been efficient. However, we do not recommend any specific cost reductions as it is not practicable to determine with any degree of substantiation the difference between actual costs and market (i.e. efficient costs) had these services been put out to tender.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

A.2 Project description

The project involves the raising Saddle Dam 3 to RL52.9 m, the raising the Awoonga Dam left abutment spillway to RL52.21 m and the construction of an auxiliary spillway channel below Saddle Dam 6. The works are required to meet acceptable flood capacity (AFC) requirements as issued by DERM (now DEWS) i.e. to achieve 65% of AFC for the probable maximum precipitation design flood (PMPDF). The project is currently being implemented with completion anticipated in October 2015.

This project was previously reviewed by the QCA in the 2010 *Investigation of Pricing Practices* (QCA, June 2010). This review concluded that further work needed to be undertaken on the assessment of alternative options and potential staged responses for the Saddle Dam No 3 upgrade before an appropriate solution could be identified that addressed environmental and other concerns. However, the QCA concluded in its review that significant expenditure is required to meet dam safety standards within the next regulatory period. As such, the QCA included an indicative cost estimate of $26 million for the Saddle Dam embankment, but excluded $1 million for the raising of the left abutment.

There is a significant variance between the total forecast project expenditure at the time of writing and that included in the 2010 QCA submission. The table below presents a summary of these project costs and the variance.

Table A.2: Project cost summary ($'000) (Cardno, 23 September 2014)

Project Description	QCA forecast	Actual project cost (Jun 2014)	Forecast total capital project cost	Estimated variance with QCA forecast
Awoonga Dam Spillway AFC Upgrades	22,110	827	8,993**	-13,117

** Total project cost of $9.537 million includes operating expenditure of $0.544 million (pre-feasibility[4]) and capital expenditure of $8.993 million.

A.3 Proposed capex

Table A.3 shows the cost for the Awoonga Dam Spillway Capacity Upgrade within the 2009 to 2015 budgets.

Table A.3: Awoonga Dam Spillway Capacity Upgrade capex ($'000)

Source	2010/11	2011/12	2012/13	2013/14	2014/15	Subsequent years	Total
Email from QCA to Jacobs regarding project selection					8,307		8,307
Capital Expenditure Review *					8,993		8,993
GAWB Asset Model†				1,021	7,971		8,992
Reconciliation of capex variance◆				1,034	7,958		8,992

* Capital Expenditure Review – QCA, Rev 6 (Cardno, 23 September 2014)

† GAWB Asset Model - Summary of total project spend (GAWB, 27 September 2014)

◆ Reconciliation of capex variance identified by Jacobs (GAWB, 22 October 2014)

In response to our RFI, GAWB provided a breakdown of expenditure for the project, which included the incidence of the expenditure over previous years, as shown above.

A.4 Documentation reviewed

The key reference documents used for this review are:

- *Project Closure Report - Awoonga Dam – Saddle Dam No 3* (GAWB, no date)
- *GAWB Asset Model - Summary of total project spend* (GAWB, 27 September 2014)
- *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- *Awoonga Dam Acceptable Flood Capacity Upgrade - Detailed Design Report* (GHD, August 2014)
- *Evaluation Report on Request for Tender for Awoonga Dam Spillway AFC Upgrade* (Flinders Group & Hyder, 28 May 2014)
- *Business Case: OP2009-027A Awoonga Dam Spillway Acceptable Flood Capacity - Stage 2* (GAWB, May 2014)
- *Business Case: OP2009-027 Awoonga Dam Spillway Acceptable Flood Capacity - Stage 1* (GAWB, March 2014)

[4] As advised by GAWB at the capex 'conclave' meeting in October 2014.

- *Awoonga Dam AFC Upgrade Project - Constructability Review Output Report* (Flinder Group, 25 November 2013)
- *Fee Proposal - Constructability Review and Related Project Management Services for the Awoonga Dam AFC Upgrade Project Stage 1* (Flinders Group, 2 July 2013)
- *Awoonga Dam AFC Upgrade Project - Concept Design for Saddle Dam no 3 Stage 1 Raise* (GHD, February 2013)
- *Guidelines on Acceptable Flood Capacity for Water Dams* (DEWS, January 2013)
- *Business Case: OP2009-027 Awoonga Dam Spillway AFC 2015 Upgrade Planning Phase* (GAWB, June 2011)
- *Project Justification Form – Awoonga Spillway Capacity Upgrade Business Case* (GAWB, 1 April 2011)
- *Report for Awoonga Dam - Saddle Dam 3 - Acceptable Flood Capacity Assessment* (GHD, February 2011)
- *OP2009-027 Awoonga Dam - Saddle Dam No 3 Project Plan/Business Case Variation* (GAWB, 6 January 2010)
- *Final Report - Gladstone Area Water Board: Investigation of Pricing Practices* (QCA, June 2010)
- *OP2009-027 Awoonga Dam - Saddle Dam No 3 Project Plan* (GAWB, 9 January 2009)
- *Awoonga Dam Safety Condition Schedule* (DERM, September 2009)
- *Water Supply (Safety and Reliability) Act 2008*

A.5 Key drivers

The primary driver identified for this project is regulatory requirement. According to the QCA's final report issued in June 2010 (QCA, June 2010), DERM (now DEWS) required Saddle Dam No 3 to be upgraded to meet the AFC Guidelines. The requirements issued by DEWS were:

- At least 50% AFC by 1 October 2015 (currently 37% AFC)
- At least 75% AFC by 1 October 2025, along with the left abutment raising to at least 75% (currently 62% AFC)
- 100% AFC by 1 October 2035 (DERM, September 2009)

The dam safety guidelines were updated in 2010 and again in 2013. The effect of the 2013 update is outlined below:

- It reduced the minimum AFC compliance requirement at stage 1 from 50% of AFC to 25% of AFC or with at least 1:2000 AEP for erodible embankments by 1 October 2015
- It reduced the minimum AFC compliance requirement at stage 2 from 75% of AFC to 65% of AFC by 1 October 2025
- It maintained the 100% AFC compliance requirement by 1 October 2035 (DEWS, January 2013)

We consider the driver of regulatory compliance to be appropriate as the dam does not meet the requirements outlined in the *Guidelines on Acceptable Flood Capacity for Water Dams* (DEWS, January 2013), as required of a referable dam under the *Water Supply (Safety & Reliability) Act*. In summary, the project meets the QCA's definition of prudency as it is required to comply with a legal obligation.

A.6 The scope of works

A.6.1 Solutions development

The project was initiated in 2008 when NRW (now DEWS), through the Dam Safety Regulator, embarked on a spillway upgrade program in 2007, requiring all referable dams to undergo an AFC assessment and prescribing a 4-tranche program for completing upgrade works.

A number of options were assessed by GAWB, as outlined below:

- Options 1A and 1B – Providing roller-compacted concrete (RCC) overtopping protection of existing embankment
- Options 2A to 2D – Removing the existing embankment and replacement with a new RCC section
- Option 2E - Removing the existing embankment and placement of a concrete sill at the original saddle level
- Options 3A to 3F – Removing the existing embankment and the construction of a fuse plug embankment
- Options 4 to 4C – Raising the existing embankment and creating an auxiliary spillway in Saddle Dam 6 by the construction of concrete protective works
- Option 5 - Left abutment widening of existing spillway
- Option 6 - Left abutment side channel spillway
- Option 7 - Right abutment side channel spillway
- Option 8 - Right abutment open cut spillway (GHD, February 2011)

The options were assessed on: capital cost (based on an NPV analysis), environmental effects, social benefits, timing and servicing of project delivery and risks if the project did not proceed. The preferred option from the options analysis was Option 4a which involved raising Saddle Dam No. 3, construction of control sill and erosion protection at sill for Saddle 6, construction of downstream erosion protection, raising of left abutment existing spillway to RL 56.5 m, construction of parapet walls on main embankment and Saddle Dam No. 3, raising Saddle Dam 4 to RL 57.6 m and raising Frost Quarry to RL 54.8 m. (GHD, February 2011).

It is noted that although the preferred option was not the lowest cost option, it had substantially lower risks associated with it (i.e. the cheapest option increased the population at risk and had negative impacts on erosion and had associated environmental impacts).

We understand that the Dam Safety Regulator prefers options that reduced or eliminated flow through or overflow at Saddle dams into the Tuckers Gully tributaries, even when undertaking erosion protection work. In addition to discussions with DERM (now DEWS) and correspondence with other stakeholders, the assessment identified that GAWB should proceed with the following works:

- Raising Saddle Dam 3 to RL55.4 m
- Constructing control sill and erosion protection at the Saddle Dam 6 sill
- Raising the Awoonga Dam left abutment spillway to RL57.6 m to prevent flood overtopping which might lead to undermining of the wall foundations and wall failure
- Constructing parapet walls on the main embankment and Saddle Dam 3 to RL57.6 m
- Raising Saddle Dam 4 to RL57.6 m

Under current dam safety guidelines, upgrades can be undertaken in one stage to meet 100% of AFC, or undertaken in three stages to meet 100% of AFC. GAWB elected to use a staged approach.

Following the revision of the Guidelines on AFC for Water Dams in 2013, the following staging was determined:

- Stage 1 (by October 2015): Raising Saddle Dam 3 to RL49.6 m, raising the Awoonga Dam left abutment spillway to RL52.21 m and acquisition of easements below Saddle Dam 6

- Stage 2 (by October 2025): Raising Saddle Dam 3 to RL52.9 m
- Stage 3 (by October 2035): Raising Saddle Dam 3 and 4 and Main Dam wave wall to RL57.6 m, raising the Awoonga Dam left abutment spillway to RL57.6 m and Saddle Dam 6 erosion protection at the Saddle Dam 6 sill

Subsequently, GAWB explored efficiency gains from combining stage 1 and 2. Undertaking both stages together allows for design, construction and project management efficiency gains as well as the ability to capitalise on the current advantageous construction market conditions. Combining stage 1 and 2 also reduces downstream flood risk during interim stage construction of Saddle Dam 3. A comparison of the NPVs for undertaking Stage 1, by 2015 ($7.099 million), and Stage 2, by 2025 ($5.490 million), separately and Stages 1 and 2 together, by 2015 ($9.537 million) demonstrates that undertaking Stages 1 and 2 together provided the best value for money. From our analysis of the information we consider that there is a financial benefit in undertaking Stages 1 and 2 together. In addition, we note that this also results in a reduction in risk. As such, we consider that the preferred option represents the most efficient option for GAWB.

A.6.2 Project delivery

The public tendering process, involved an EOI followed by a priced tender phase, including pricing for Stage 1, and Stage 1 plus Stage 2.

The Business Case for Stage 2 was completed in May 2014 and confirmed the addition of the Stage 2 works to the project delivery. The key milestones of the Stage 2 works are as follows:

- Call for expression of interest - November 2013
- Close expression of interest - December 2013
- Request for priced tenders - March 2014
- Close priced tenders - May 2014
- Award contract - May 2014
- Start construction - June 2014
- Limit on Option for Stage 2 works - 25 July 2014
- Practical completion construction
  - Stage 1 - December 2014
  - Stage 1 + Stage 2 - February 2015
- Site works practical completion - March 2015
- Minor and rehabilitation works (post PC) - April 2015
- Acquisition of land and project close out - June 2015

We consider the revised timing for the milestones to be reasonable. This is based on conversations with GAWB, from which we understand that the construction is approximately 33% complete and materially on schedule. We also understood that the Board receives regular reports on the progress of the project, although have not sighted examples of this.

Whilst the construction contract was competitively tendered, it is noted that other services were ‘sole-sourced’. The Flinders Group was the sole supplier invited to provide a quotation for the provision of contract management services. GAWB states that “*suitable contract administration resources were not available out of Gladstone (to GAWB’s knowledge, at time of engagement). GAWB used Flinders for contract administration of McCoskers Cost Plus Contract on the Curtis Island project and Superintendent Representative Role for Awoonga Dam Pump Station project. Original resource (Peter Davidson) was Rockhampton based (since replaced with Chris Hewitt, also Rockhampton based) so there is limited travel costs, which are otherwise significant given regular attendance at meetings. Hourly rates were revised (down) from rates used on the Curtis*

Island. Rates are otherwise comparable with equivalent level rates under SOA/ Service provider Agreements." We understand that sole source justification form was completed, but have not sighted this documentation.

In addition, a single consultant was the sole supplier for the provision of engineering and construction quality assurance services. GAWB states that "*GHD has been working on the AFC project since 2010, when they replaced Connell Wagner due to rejection of original Acceptable Flood Capacity Assessment prepared by Connell Wagner in 2009 and using SunWater hydrology. GHD were used due to:*

- *Connell Wagner was reliant on large Dam expert out of Sydney (Ian Forster).*
- *SunWater were not considered an appropriate choice due to involvement with original saddle dam design (which is now being rectified). There is limited the choice of Queensland based consultants with appropriate Large Dam experience and hydrology in house. GHD has local Gladstone office but most resources used are Brisbane based.*
- *GHD AFC assessments involved Malcolm Baker (Dam Safety Risk Expert)*
- *Existing service provider arrangements"*

GAWB's purchasing policy is that for works from $250,000 to $500,000 an expression of interest/invitation to offer/invitation to tender process is required. The original budget for the lump sum design works was $363k. The value of the contract management services is not known, but is expected to be within this range. As such, the reasons for not testing the market with the use of an EOI or similar process are unclear to us and we conclude that GAWB did not adhere to its procurement policies with respect to these contracts.

Whilst the design consultant was tied to a lump sum for the design component (approximately 50% (or $403,000) of the value of the final contract value - $820,000 as at October 2014) prior to engagement, there are limited ways, at this time, of establishing whether this lump sum was reflective of the market at the time of engagement of these consultants.

We acknowledge that continuity of resourcing can lead to project efficiencies. We understand that continuity in engineering team has been achieved since 2011. We also appreciate that the use of time and expense contracts for elements of the project for which the scope of works can be hard to predict (such as obtaining approvals, land acquisition and construction assistance) are not uncommon, although we consider a better approach is to offer a time and expenses contract initially with a brief of developing and agreed scope and then requesting a fixed price to deliver this fixed scope. However, again without market testing of the rates used for these time and expense components as at the time of engagement, it is difficult for GAWB to demonstrate that the costs are efficient.

It is important to note that we are not challenging the performance of the sole sourced organisations, just the ability of GAWB to demonstrate that the costs of these services are reflective of market conditions and hence efficient. Further discussion on GAWB's use of sole sourcing is discussed in the body of this report.

A.7 Standards of service

The Awoonga Dam Spillway Capacity Upgrade has been designed in accordance with the requirements set out in the *Guidelines on Acceptable Flood Capacity for Water Dams* (DEWS, January 2013). This is the driver for the project and the standard to which the completed works must comply.

A.8 Project cost

Thirteen submissions were received in response to the EOI. A tender evaluation was undertaken by an independent consultant. These were evaluated on the following criteria (with weighting):

- Demonstrated performance - 35%
- Risk - 25%
- Safety, health and environment - 15%

- Capacity - 10%
- Local industry participation - 10%
- Completeness and conformity - 5%

We consider these weightings to be appropriate.

Six of the tenders were shortlisted to proceed to the request to tender phase based on the outcomes of the EOI evaluation, five of which submitted a tender. All tenders were evaluated on reasonable and detailed criteria (including value for money (40%), risk (10%), personnel (15%), program and methodology (15%)). The three highest scoring tenders were shortlisted to receive tender clarifications. Further evaluation of the tenders resulted in the recommendation that the contract be awarded to Golding Contractors.

We conclude that an appropriate and robust tendering process was undertaken for the construction works, and as such, we consider the construction costs for the implementation phase to be in line with market conditions.

The tender was awarded to Golding Contractors in mid-2014 and that the works are currently under construction, with approximately a third of the works complete. We understand from discussions with GAWB that the works are materially on track and on budget with reference to the milestones outlined in the Business Case. We have not sighted (nor requested) the board progress reports.

Based on the proposed project budget in the Tender Evaluation Report (Flinders Group & Hyder, 28 May 2014) should be as follows:

Table A.4: Proposed project budget from Tender Evaluation Report

	Construction cost	Recommended contingency	Total
Stage 1 and 2	$3,895,462	10-15%	$4,479,781
Alternative road	$573,788	30%	$745,924
Total	**$4,469,250**		**$5,225,705**

As the contract price for Stages 1 and 2 are based on aspects of the work that have been designed, measured and priced at competitive rates, we consider the contingency rate of 10-15% to be appropriate. As the road has not been designed and the scope is still uncertain, we also consider the 30% contingency to be appropriate.

A comparison of this value against the Principal Contract is the Quarterly Report 30 June 2014 is shown below:

Table A.5: Comparison of Principal Contract values

Source	Construction cost	Recommended contingency	Total
Tender Evaluation Report	$4,469,250	As above	$5,225,705
Quarterly Report 30 June 2014	$6,238,000*	Included	$6,238,000
Approximate variance			**$1,012,295**

*This represents budget as at 30 June 2014, figure only provided in $'000s

GAWB has explained that the variation in the recommended value from the Tender Evaluation Report and the Quarterly Report 30 June 2014 is primarily related to handling and reporting of direct and in-direct labour costs of construction supervision. Internal costs due to engineering and contract management are allocated separately. This is shown in Table A.6.

Table A.6: Construction – Principal construction costs

	Construction cost ($'000)
Tender Stage 1 & 2 earthworks + Alternative Access" Road D&C	4,861
Anticipated post tender variation - alt road design documentation	30
Anticipated post tender variation - site access maintenance	25
Anticipated post tender variation - insurances and bank guarantees	25
Subtotal likely contract total at award	**4,941**
GAWB Labour at 5%	247
Subtotal including GAWB labour	**5,188**
Contingencies at 25 %	1,297
Contract Estimate at completion	**6,238**

The current estimate of costs for completion is $5.824 million as shown below. This cost excludes excluding any GAWB internal labour costs or associated labour hire costs related to directly supervising and monitoring of the principal contract,.

Table A.7: Current estimate of construction costs for completion

	Construction cost ($'000)
Contract value at execution (Bill of Quantities/Schedule)	4,360
Contract value – variance (to date) due to increase in quantities within tolerance of Bill of Quantities	36
Variations to the contract - Approved	243
Variations to the contract - Acceleration	380
Variations - identified but not quantified by the contractor. (Estimated costs)	805
Current Estimate at Completion	**5,824**

GAWB has provided a breakdown of the approved variations ($243k) and a Goldings' document outlining the costs and justifications for acceleration ($380k) and a breakdown of the identified variations ($805k). GAWB states that its cost assessment does not align with Goldings' list of identified variations. The main difference being in how items are be quantified and valued. The reconciling of these two different cost assessments is work in progress and final confirmation of a number of cost items will not be known until January 2015.

In addition to the difference in Principal Contract costs, the project budget also contains a number of additional costs. These are shown in Table A.8.

Table A.8: Proposed project budget

Item	Forecast cost - Quarterly Report 30 June 2014	Percentage of overall project costs
Planning phase	$925	10.3%
Principal contract	$6,238	69.4%
Other works	$390	4.3%
Engineering/QC	$230	2.6%
Project management	$211	2.3%
Internal labour	$181	2.0%
Land acquisition	$332	3.7%
Post construction items	$485	5.4%

Item	Forecast cost - Quarterly Report 30 June 2014	Percentage of overall project costs
Total	**$8,992**	**100.0%**

Additional information has been provided to support:

- The 'other' works ($390,000) – consisting of the blockwork wall on the left abutment, cultural heritage monitors during clearing, a fauna spotter during clearing and road maintenance
- Construction phase engineering and quality control ($230,000) – consisting mainly of fees for an engineering consultant and an allowance for internal costs
- Construction phase project management assistance ($392,000) – consisting mainly of fees for an engineering consultant and an allowance for internal costs
- Land ($332,000)
- Post construction ($485,000)

Whilst we have concerns regarding the sole sourcing of the engineering design and contract administration elements of this project, as discussed in Section A-5, we have not made any specific recommendations for reductions in costs as it is not practicable to determine, at this time, the difference between these costs and costs that could be obtained through competitive tendering at the time of contract let.

A.9 Capex trade-offs with opex (substitution possibilities)

No substitution possibilities between capex and opex or non-network solutions are possible for this project, as capital works are required to meet the regulatory requirements.

A.10 Efficiency gains

As discussed in **Section A.6.1**, GAWB is proposing to undertake Stages 1 and 2 of the project sequentially, with completion by 2015. By undertaking the two stages together GAWB suggests that efficiencies can be gained in design, construction and project management. A cost comparison undertaken by GAWB demonstrates that undertaking Stage 1 and 2 sequentially (by 2015) has a lower cost (NPV of $9.537 million) than undertaking Stage 1 (by 2015) and Stage 2 (by 2025) separately (NPV of $7.099 million and $5.490 million respectively). From our review of this analysis, we agree with GAWB's decision to undertake Stages 1 and 2 sequentially.

In addition, we understand that a constructability review of design (undertaken by GAWB's consultants) identified major cost savings, mainly with respect to the haul road and site access but with other minor detail design changes, that have been realised in construction. The quantity of cost savings has not been provided.

A.11 Implications for operating expenditure

It is not anticipated that this project will have significant impact on operational costs. This is due to the project involving the raising of the existing infrastructure only which is maintained under existing arrangements. The works may increase operational costs marginally, as Saddle Dam 3 and the Awoonga Dam left abutment spillway will be higher, but it not anticipated that additional maintenance requirements will be introduced as a result of this project.

A.12 Policies and procedures

We consider that, with respect to project implementation and the tendering of the construction works, GAWB's policies and procedures have been complied with for the following reasons:

- All documentation required under GAWB's capital delivery processes has been sighted for this project, as detailed in **Section A.4**.

- An EOI and invitation to tender process was adopted for the main contract as per GAWB's purchasing policy

We do not consider GAWB's purchasing policy was followed with respect to the sole supplier invitation for:

- The provision of contract management services by Flinders Group
- The provision of engineering and construction quality assurance services by GHD

A.13 Assessment of reported expenditure

Table A.9 below identifies the revised capex for the Awoonga Dam Spillway Capacity Upgrade.

Table A.9: Awoonga Dam Spillway Capacity Upgrade revised capex ($'000)

Source	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Subsequent years	Total
Email from QCA to Jacobs regarding project selection						8,307		**8,307**
Jacobs proposed value					1,034	7,958		**8,992**
Variation (to original value)					1,034	-349		**685**

A.14 Extrapolation to other projects

Given the unique nature of the project, and as there were no systematic issues identified, we do not consider that the findings from this review can be extrapolated to other projects.

A.15 Summary/conclusions and recommendations

A.15.1 Summary

Table A.10 presents an overview of the findings of the prudency and efficiency of the project.

Table A.10: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Awoonga Dam Spillway Capacity Upgrade	Prudency		The project is assessed as prudent as the primary driver of Compliance has been demonstrated through the requirement to the Acceptable Flood Capacity (AFC) Guidelines.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are consistent with industry practice. The costs associated with the principal contract are consistent with prevailing market conditions. We note that the contract management services and consulting engineering services were sole soured, so hence may not have been efficient. However, we do not recommend any specific cost reductions as it is not practicable to determine, at this time and with any degree of certainty, the difference between these costs and costs that could be obtained through competitive tendering at the time of contract let.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

A.15.2 Recommendations

We recommend that the allowed efficient expenditure be $8.99 million.

Appendix B. Offline storage and repump station

B.1 Executive summary

The project involves the construction of a 1 Ma, 200 ML in-system storage and repump station located at Toolooa, between Awoonga Dam and Toolooa Reservoir. This project was identified through a risk assessment undertaken by GAWB in relation to the reliance of GAWB's delivery network on the daily operation of the Awoonga Dam Pump Station (ADPS). The detailed design is currently being undertaken with construction anticipated to be completed in 2017.

The project was previously reviewed by the QCA in the 2010. This 2010 review concluded that further investigative work on the range of options to improve system storage capability was required prior to proceeding. As such, the QCA included $2 million to undertake this work, from the $22 million proposed by GAWB. At the time of writing the forecast capital expenditure is $21.95 million.

During this investigation we have reviewed the options considered by GAWB in the selection of its preferred solution. There are two key options; the preferred option selected by GAWB consisting of an Offline Storage and an alternative solution of a Pontoon Pump Station. We acknowledge that both options are valid and have specific benefits. For example, the Offline Storage options mitigates risks associated with the main transfer pipe between Awoonga Dam and Toolooa Reservoir. However, as the Pontoon Pump Station provides greater capacity at a lower capital cost, it is the preferred technical solution.

At this stage, the design of the Pontoon Pump Station has only been developed to a concept design level. We recommend that GAWB further considers this option, including the mooring system proposed within this report. As part of this report, we have outlined how GAWB's primary concerns with the Pontoon Pump Station could be addressed, including securing the Pontoon Pump Station to avoid dam safety risks and operating the Pontoon Pump Station during a flood. In the advent that during the subsequent investigations, there are found to be fatal flaws with the Pontoon Pump Station (for example, geotechnical information suggests that GAWB will be unable to effectively install the mooring system, the health and safety risks cannot be satisfactorily mitigated or the cost estimates are found to be materially higher than estimated) the Offline Storage would default to be the preferred option.

From our analysis we conclude that the project is prudent and efficient, with efficient costs being determined at circa $13.1 million based on our concept design of the Pontoon Pump Station. An overview of the findings of the prudency and efficiency of the project is presented in Table B.1.

Table B.1: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Offline Storage and Repump Station project	Prudency		The project does not strictly meet the primary driver (as per the QCA TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' as the project has not been explicitly endorsed by customers. However, Jacobs concurs that there is a need for GAWB to undertake condition assessment and maintenance on critical assets and note that this links to the good practice clause in customer contracts. As such, we find the need for expenditure to be prudent albeit that, regulatory approval under this driver requires customer endorsement.

Project	Assessment	Outcome	Summary
	Efficiency		Regulatory efficiency is a two-part test: 3. Firstly whether the regulated entity's preferred option reflects the least cost in terms of the total of capex and opex over the life of the asset whilst providing the greatest utility in terms of the regulatory driver. Therefore, when comparing options with different asset lives we consider the life cycle (or NPV) cost of the various options over the period of the longest life option, together with the extent to which each option delivers on the regulatory driver. [An exception to this is when the regulatory driver has a shorter life than one of the options, in which case the comparison of life cycle costs is limited to the duration of that driver.] 4. Secondly, whether the costs proposed by the entity for its preferred option are the costs that would be incurred by a knowledgeable and efficient operator. In view of the two part test, we consider: 3. That the life of the regulatory driver is not relevant (or limited) in this case. Therefore, the option with the least cost NPV over the life of the longest-life asset that delivers the highest utility per unit of cost will be preferred. We note GAWB's submission that the NPV costs of our preferred technical solution (Pontoon Pump Station) and theirs (Offline Storage) are sufficiently similar to disqualify cost as the deciding factor. The basis of this NPV comparison has not been provided. We note that our solution delivers more days of storage than the Offline Storage and therefore greater utility. GAWB has submitted a list of maintenance activities that could take over 14 days to undertake, which would not be possible to achieve using the Offline Storage option. In addition, access to a greater storage could allow for several maintenance activities to be undertaken concurrently during the same shut down period resulting in efficiencies; and to provide a larger buffer for unforeseen eventualities. In summary, our solution is efficient on this first criterion. By comparison, on the first test, GAWB's preferred solution may deliver less utility for a higher capital cost, arguably making it inefficient when compared to our option. 4. On the second test, we consider that GAWB is a knowledgeable and efficient operator and that, all things being equal, the proposed cost of its preferred solution is efficient. Similarly, our review of GAWB's submitted costs, for our preferred option, supports our view that the Pontoon Pump Station costs are also efficient. Accordingly, our option is efficient on both criteria and GAWB's is partially efficient.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient),
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency), and
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient).

B.2 Project description

The project involves the construction of a 1,200 ML in-system storage and repump station located at Toolooa, between Awoonga Dam and Toolooa Reservoir. This project was identified through a risk assessment undertaken by GAWB in relation to the reliance of GAWB's delivery network on the daily operation of the Awoonga Dam Pump Station (ADPS). The detailed design is currently being undertaken with construction anticipated to be completed in 2017.

This project was previously reviewed by the QCA in the 2010 *Investigation of Pricing Practices* (QCA, June 2010). This review concluded that further investigative work on the range of options to improve system storage capability was required prior to proceeding. As such, the QCA included $2 million to undertake this work, from the $22 million proposed by GAWB.

B.3 Proposed capex

Table B.2 shows the proposed cost of the Offline Storage and Repump Station project within the 2015 to 2020 budgets.

Table B.2: Offline Storage and Repump Station project proposed capex ($'000)

Source	Previous years	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Sample confirmation email (dated 15/10/2014)			21,106				21,106
Capital Expenditure Review *				21,948			21,948
Reconciliation of capex variance†	622	220	21,106				21,948
Capital works cost estimate^			20,343				20,343

* Capital Expenditure Review – QCA, Rev 6 (Cardno, 23 September 2014)

† Reconciliation of capex variance identified by Jacobs (GAWB, 22 October 2014)

^ GAWB Offline Storage - Capital Works Estimate (GAWB, 31 January 2014)

In response to our RFI regarding the difference between the cost estimate provided to us and the cost estimate reviewed by Cardno, GAWB provided a breakdown of expenditure for the project, which included additional expenditure in previous years.

We note that there is difference of approximately $1.6 million between the total project value included in the *GAWB Offline Storage - Capital Works Estimate* (GAWB, 31 January 2014) and the value submitted to us by GAWB. It is also noted that there is approximately $760,000 difference if previous years are excluded. No information has been provided to enable us to explain this difference.

B.4 Documentation reviewed

The key reference documents used for this review are:

- Response to QCA Draft Report Review of Pontoon Pump Station Option (CDM Smith, 19 March 2015)
- *Email RE: QCA* (GAWB, 24 October 2014)
- *Reconciliation of capex variance identified by Jacobs* (GAWB, 22 October 2014)
- *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- *Offline Storage and Repump Station - Multi Criteria Analysis* (CDM Smith, 12 September 2014)
- *Offline Storage and Standby Pumping Project - Storage Capacity Discussion* (Cardno, 26 August 2014)
- *Feasibility Study - Standby Storage/Pumping - Project Plan* (GAWB, 6 April 2014)
- *GAWB Offline Storage - Capital Works Estimate* (GAWB, 31 January 2014)
- *Strategic Water Plan* (GAWB, November 2013)
- *Concept Development Report, Draft* (Cardno, 23 September 2013)
- *Storage/Pumping Options Due Diligence Review* (R2A, July 2010)
- *Conceptual Design Report Standby Storage/Pumping System* (Aurecon, July 2010)
- *Final Report - Gladstone Area Water Board: Investigation of Pricing Practices* (QCA, June 2010)
- *Report for Awoonga Dam - Dam Maintenance Requirements and Effect on Reliability of Supply* (GHD, May 2010)

- *Off-Line Storage Feasibility Study Report* (Aurecon, January 2010)
- *Critical Assets Due Diligence Review* (R2A, February 2009)
- *Report for DN700 Raw Water Pipeline from Awoonga Dam: Report into Options for Remediation Works* (GHD, October 2009)
- *EDOCs n326190 v3 response to Jacobs other issues offline storage.docx*
- QCA AWD Pipework.xlsx

B.5 Key drivers

The primary driver identified for this project is risk which we consider maps, at least in part, to the regulatory driver of "*achieves an increase in the reliability or the quality of supply that is explicitly endorsed or desired by customers or* [relevant] external *agencies*". Following the strict definition of this driver, as the customers' willingness to pay has not been demonstrated, Jacobs cannot find the works to be prudent.

At the meeting with GAWB on the 29th October 2014 (Capex Conclave, 2014), GAWB stated that the customers willingness to pay is being tested through their *2015 Price Monitoring Investigation Submission*. Jacobs recognises that GAWB's clients are sophisticated organisations, with the technical ability to appreciate the complexity of the project and decide whether the project should proceed, based upon a reasonable understanding of the balance of risks and costs. To facilitate this process, within this report, we outline the costs and risks as presented to Jacobs.

The two main risks are as follows:

- Need to undertake critical asset assessment and maintenance
- Insufficient storage in GAWB's delivery network.

These are discussed further below.

Critical asset assessment and maintenance

The need to undertake critical asset assessment and maintenance is supported by GAWB's customer supply agreements. We have reviewed GAWB's generic supply contract "EDOCS n250660 v1 Standard Water Supply Agreement 18 7 2013.docx" and note that the obligations on GAWB are to take reasonable steps to ensure that:

- *appropriate storage management practices are implemented so that GAWB's water supply commitments do not exceed the Maximum Supply Capacity of the System…*
- *reasonable preventative, routine and non-routine maintenance and repairs are performed taking into account the manufacturer's guidelines and performed by knowledgeable, trained and experienced personnel utilising suitable equipment, tools and procedures…*
- *there is a periodic assessment of risks associated with the maintenance and operation of the System and the Delivery System…*
- *strategies are implemented to manage identified risks associated with the maintenance and operation of the System and the Delivery System.*

As such, we conclude that it is necessary for GAWB to undertake critical asset assessment and maintenance.

Insufficient storage in GAWB's delivery network

GAWB identified, through a risk assessment in 2009, that it has 12 to 16 hours of storage available in its delivery network, which has a high reliability on the operation of the ADPS. In order to replenish delivery network storage it is necessary to pump water from Awoonga Dam every 24 hours. Consequently, maintenance can only be performed on ADPS and the infrastructure connecting it to Awoonga Dam in constrained circumstances. The *Critical Assets Due Diligence Review* (R2A, February 2009) identified a number of failure modes for which it suggested would take typically up to, but for some activities significantly over 14 days to

rectify. Some of these were identified as not credible or as having existing mitigating measures, as shown below. Whilst the failure modes were identified, the likelihood of these failures occurring was not identified.

Table B.3: Identified failure modes

Failure mode	Criticality (days duration)*	Comment
Sabotage / terrorism	1000	
Dam failure	1000	
Drought	36	
SunWater infrastructure failure	14	
Inundation (tail water)	14	Not credible
Fire/explosion in HV switch room	14	Stated within meetings with GAWB as the most likely failure mode
Pump well flood (broken pipe)	14	Replacement motor available for pump 3 restricted supply at current demand
Fire/explosion in VFD building	14	Continue pumping using pump 3
Fire/explosion in pump well	14	Replacement motor available for pump 3 restricted supply at current demand
Loss of surge tank	14	
Corrosion/erosion of spillway pipe	14	

Source: *Critical Assets Due Diligence Review* (R2A, February 2009)

The method used to determine the duration of the outage for each failure modes has not been sighted. It is noted that a Functional & Common Mode Assessment Workshop was held on Wednesday 4 February 2009; however no details have been provided to us.

For the maintenance activities on Awoonga Dam, the *Report for Awoonga Dam - Dam Maintenance Requirements and Effect on Reliability of Supply* (GHD, May 2010) details the refurbishment and maintenance requirements, their durations and whether the works require the pump station to be offline. A number of maintenance activities on Awoonga Dam were identified and the likely duration of the required outage to complete the refurbishment/replacement of particular assets tabulated against the maintenance activity.

The table below contains extracts from the *Report for Awoonga Dam - Dam Maintenance Requirements and Effect on Reliability of Supply* (GHD, May 2010) on the refurbishment activities with a duration greater than 10 days. We have selected 10 days as a trigger for requirement of a greater than 15 day storage as it is typically necessary to allow additional time to accommodate problems that may occur during refurbishment activities such as major mechanical components becoming lodged, issues with compatibility of replacement components which may require rework of such to enable them to be installed etc. The maintenance activities identified by GAWB's consultant that we have not provided in the table below all have a projected duration of less than 10 days. As part of the Dam Safety Compliance Works Project (refer Appendix G) some of the assets listed below have undergone further inspection and maintenance since GAWB's consultant prepared its report, as such some of the comments below may no longer be up to date, or, indeed, may have been validated. Where we are aware of further inspections and maintenance activities, these are mentioned below. Of the activities identified, 3 have been assessed by GAWB's consultant as requiring greater than 10 days, 4 have been identified as requiring between 2 to 4 weeks, 1 has been identified as requiring 5 to 15 days and 1 has been identified as requiring 2 to 4 months.

Table B.4: Identified long duration refurbishment activities

Asset	Asset Condition	Refurbishment Requirements			Jacobs' comments based on the Dam Safety Compliance Works Project
		Required Refurbishment	Time to Refurbishment (Years)	Duration of Refurbishment	
Vertical pipe stack	Unknown condition	Replacement or Refurbishment of a section of pipe	1-20	2-4 weeks	The vertical pipe stack was inspected and corrosion repairs undertaken by Aestec as part of the Dam Safety Compliance Works (refer Appendix G). However, the inspection and repairs may not have included all of this pipework.
Vertical pipe stack	Inspection very difficult	Replacement /Refurbishment of entire stack	20-50	2-4 months	
DN1400 Pipe (existing chlorination pipe currently being removed)	Good condition overall. Some local remedial work required. Internal condition unknown	Replacement or Refurbishment of pipework	1-5	5-15 days	The pipe may have been inspected as part of the replacement of the DN1400 butterfly valve as part of the Dam Safety Compliance Works (refer Appendix G).
DN2200 pipe from Outlet Tower	Good condition overall. Some local remedial work recently completed.	Refurbishment or Replacement of sections of pipe Ongoing maintenance may preclude this requirement	20-50	2-4 weeks	Not considered within Dam Safety Compliance Works
DN2200 Pipe from Auxiliary Outlet	Condition unknown but relatively new and expected to be in good condition	Refurbishment or Replacement of sections of pipe Ongoing maintenance may preclude this requirement	40	2-4 weeks	Not considered within Dam Safety Compliance Works
DN2200 pipe (to cone valve) The lining type for the pipeline is uncertain as to the location of the MSCL and Coal tar Epoxy for which it is assumed the transition occurs at the bifurcation to the DN900 pipeline.	Good condition overall with exception of damaged coal tar epoxy	Refurbishment or Replacement of sections of pipe Ongoing maintenance may preclude this requirement	20	2-4 weeks	The pipeline condition may have been further assessed as part of the cone valve replacement
DN1400 pipe (suction) to GAWB pump station	Condition unknown. A section of original suction pipe is thought to still be in service dating back to when the dam was first built in the 1950s.	Refurbishment or Replacement of sections of pipe	0-20 Outside in Valve Pit presently being repainted.	>10days	As outside the valve pit, this may not likely to have been reviewed as part of the valve replacement works
DN2200 pipe from bifurcation to Awoonga-Callide pump station (suction)	Refer to SunWater for inspection results	Refurbishment or Replacement of sections of pipe	20	>10days	Not considered within Dam Safety Compliance Works
DN2000 delivery pipe from GAWB pump station to transition into	Condition unknown	Refurbishment or Replacement of sections of pipe	20	>10days	Not considered within Dam Safety Compliance Works

Asset	Asset Condition	Refurbishment Requirements			Jacobs' comments based on the Dam Safety Compliance Works Project
		Required Refurbishment	Time to Refurbishment (Years)	Duration of Refurbishment	
DN700 & DN1440 pipes					

From the above table, we conclude that GAWB's consultant has identified a material number and types of maintenance activities on the single point of failure assets up stream of the Awoonga Dam pump stations that will require greater than 14 days to complete.

In addition to the above reports, GAWB has provided a list of critical assets, which require inspection and maintenance. As a consequence of the current configuration of large diameter pipe (DN1500 to DN2200) at the Awoonga Dam outlet and either side of Awoonga Dam Pump Station, we understand that the following pipe sections cannot be independently isolated and bypassed:

- Auxiliary intake pipe
- Old intake tower vertical pipe stack and dam outlet pipe to junction with auxiliary intake pipe
- Dam outlet pipe from junction of Old Intake and Auxiliary Intake pipes to bifurcation to Callide (SunWater) pipeline
- Dam outlet pipe from Callide Pipeline bifurcation to Awoonga Dam Pump Station (Awoonga Dam Pump Station Inlet)
- Awoonga Dam Pump Station Outlet Pipe to Surge Tank
- Surge Tank
- Spillway pipeline from surge tank to bifurcation into DN1440 & DN700 pipelines

Due to the position of these assets and the need to isolate and drain pipework, we agree that for some assets this is not possible within the current shutdown window due to a lack of storage within the network. On this basis, we conclude that the work is required to meet GAWB's supply standards, and therefore, is prudent.

Whilst we believe that the work is required on the basis of the need to undertake asset condition assessments and maintenance on key assets; this is not currently supported by a strong link to a regulatory acceptable driver. Obtaining customer approval would provide a link to the stated regulatory driver.

As noted previously, GAWB stated that the customers' willingness to pay is being tested through their *2015 Price Monitoring Investigation Submission*. GAWB considers no negative responses to the *2015 Price Monitoring Investigation Submission* to be an acceptance of the customers' willingness to pay. We do not concur with GAWB on this matter as silence should not, as a general principal, be capable of being taken as implicit approval.

B.6 The scope of works

B.6.1 Solutions development

The *Critical Assets Due Diligence Review* (R2A, February 2009) identified the option of a large off-line storage to address the potential 14 day outage. A subsequent report by Aurecon identified alternate solutions including alternative pump stations. The *Off-Line Storage Feasibility Study Report* (Aurecon, January 2010) identified six potential sites for the location of the storage (Site 1, 2, 3, 4, 5A and 5B) and four pumping options for the off-line storage. These were:

- Option 1: Reuse existing Toolooa Booster Pump Station pumps
- Option 2: Reuse Awoonga Dam "Pump No. 3" spare pump
- Option 3: New submersible pump

- Option 4: New dry mounted centrifugal pump

From initial assessment of the above, four options were developed and assessed using MCA. The options were:

- Option 1: Site 1 Dam (near Toolooa Booster Pump Station)
- Option 2: Site 2 Dam (near Toolooa Bends)
- Option 3: Pontoon at Awoonga Dam
- Option 4: Boyne River Pump Station

The criteria used for the MCA were: risk, operation and maintenance, constructability, environmental and regulatory, social, health and safety and capital cost. We consider these criteria to be appropriate for options assessment.

From the MCA, Option 3 (a pontoon pump station at Awoonga Dam was identified the best option. The *Off-Line Storage Feasibility Study Report* (Aurecon, January 2010) recommended that options for constructing a Pontoon Pump Station at the Awoonga Dam and a storage and pump station at Site 2 be further investigated.

The *Conceptual Design Report Standby Storage/Pumping System* (Aurecon, July 2010) further investigates:

- An offline storage at Site 2
- A pontoon pump station on Awoonga Dam

The requirements and issues associated with each of the issues are discussed and capital costs estimates and NPV evaluations undertaken. The Pontoon Pump Station on Awoonga Dam has a much lower capital cost and a lower present value cost than the offline storage at Site 2 ($10.4 million vs $21.6 million for capital costs and -$11.4 million vs -$15.4 million for NPV). The report however states that: *"The offline storage at Site 2 best satisfies the project objectives to reduce risk of unscheduled water supply interruption. The Pontoon Pump Station is expected to be more difficult to maintain and operate, but has significantly lower capital cost and would be simpler and quicker to implement, and operate as an alternative supply indefinitely."* It is noted that this is a draft version of the report, with the 'Conclusions and recommendations' section not completed.

The two options from the *Conceptual Design Report* were further reviewed in the *Storage/Pumping Options Due Diligence Review* (R2A, July 2010). The two options were compared on the projects "critical success factors", being fit for purpose, design life, capital cost, whole of life cost, timing, operational and maintenance issues, safety issues, environmental issues and social issues.

The report concludes that the off-line storage option addresses all of the identified critical failure modes and Awoonga Dam maintenance requirements whereas the pontoon pumping station does not address failures associated with the main transfer pipe between Awoonga Dam and Toolooa Reservoir. To address this, it is suggested that duplicate pipeline in redundant configuration would need to be constructed at a cost of approximately $40 million, which it states: "makes the option not viable".

The *Concept Development Report* (Cardno, 23 September 2013) further developed the design of the offline storage option.

The *Offline Storage and Repump Station - Multi Criteria Analysis* (CDM Smith, 12 September 2014) was commissioned by GAWB to review the justification of the project which included a high level multi-criteria analysis (MCA) considering all viable alternatives to the offline storage. The reason for undertaking a further options analysis subsequent to the 2010 options analysis and 2013 concept design was stated by GAWB as an opportunity to reconfirm the preferred solution.

The options assessed were:

- 1,200 ML in-system storage located at Toolooa
- Pontoon Pump Station on Awoonga Dam

- Pontoon Pump Station on Awoonga Dam with a redundant pipeline between Awoonga Dam and Toolooa Reservoir.

We note that the options assessed in the MCA report (CDM Smith, 12 September 2014) are the preferred options identified in the Business Case Study. The GAWB submission indicates that other options including emergency use of the 'Callide Pump Station' and the use of diesel generators at Awoonga Dam were assessed but not considered credible.

The MCA report (CDM Smith, 12 September 2014) assessed three options in a workshop using a multi-criteria assessment process that considered:

- Risk mitigation - To what extent does the option mitigate the risks of planned and unplanned events (40%)
- Cost - Capital cost and operating cost (30%)
- Staging and ability to upgrade - Option to meet future demands and or ease of upgrades to meet future demands (5%)
- Raw water quality - Potential impact on the quality of water entering the WTP both advantageous and disadvantageous (10%)
- Complexity of operation and maintenance - Potential to introduce new and/or increase high risk activities required to operate and maintain the option (10%)
- Stakeholder impacts - Potential impacts on external stakeholders excluding customers (5%).

From the MCA, GAWB determined that the creation of approximately 14 days' supply from an offline storage represented best value in the specific circumstances. In particular, the Pontoon Pump Station did not address pipeline failure risks between the Awoonga Dam and the identified offline storage site, and introduced operational and maintenance risks with the location of the pumping system over water.

We consider the assessment criteria used in the MCA to be appropriate, although we find the weighting given to risk to be higher than we would recommend applying and note that this is consistent with GAWB's stated primary driver for the project. We do not have the raw scores to be able to undertake a sensitivity analysis of the effects of changing the weighting of the risk criteria. In addition, it is understood that only two people participated in the workshop (one representative from GAWB with the other from the consultant undertaking the MCA). We are concerned that by having a small workshop group, an objective analysis may not have been undertaken as the views of some stakeholders may not have been considered.

The key differences between the offline storage and Pontoon Pump Station options are the risks associated with transferring supply along two parallel pipelines; an older DN700 pipeline and a newer pipeline with diameters of DN1400 and DN1086. The DN700 pipeline was constructed in 1965 and 1966 and is mostly above ground.

In 2009, GAWB's consultant advised in its report: Report for DN700 Raw Water Pipeline from Awoonga Dam: Report into Options for Remediation Works (GHD, October 2009) that the cement mortar lining (CML) of the raw water pipeline from Awoonga Dam to Fitzsimmons St Reservoir, was showing signs of deterioration, although GAWB's consultants noted that "…the impact of the aggressive raw water quality on the loss of CML may be minor at this time". However, "… sections where the CML has been dislodged show corrosion on the interior of the steel pipeline wall." Nevertheless, the results of the 2009 inspection revealed that "… ultrasonic thickness testing of the steel pipeline walls confirms that the majority of the wall is sound, [but] … approximately 1.5% of the tests … show steel wall thickness below 5mm…"

GAWB's consultants recommended continued monitoring of the pipeline and the welding on of "…MS plate [to] patch pin-hole perforation leaks…", "… of collars in areas where internal corrosion is [becomes] more extensive than simple pin-hole type perforations…" and replacement of sections "… with new mild steel cement lined (MSCL) pipe…". GAWB's consultants also recommended that GAWB stock pre-prepared sections and for such repairs and that this approach would be more cost effective than internal re-lining by pulling through smaller pipe or internal re-lining.

We note that GAWB's preferred course of action EDOCs n326190 v3 response to Jacobs other issues offline storage.docx for this pipeline is to "reline or slip line … high risk sections in stages over the current FY and next five years due to high consequence of leak or failure in these sections". Albeit we note that GAWB also advices, in the same document, that "the potential for a catastrophic failure, while unlikely, is a possible outcome".

On balance, therefore, and taking into account the recommendations of GAWB's consultants we consider that there is insufficient supporting information to justify major refurbishment of the sections of the pipeline where the CML has been compromised this regulatory period.

Additional options to minimise the scope of works required, including discussions with customers regarding private storages to reduce supply risks and undertaking work during periods of reduced demand, have not been documented.

Overall, we consider that a detailed options investigation and analysis have been undertaken. We understand that GAWB is faced with a challenging decision regarding deciding between two valid options with different risk and cost profiles. As noted in the Offline Storage and Repump Station - Multi Criteria Analysis (CDM Smith, 12 September 2014), "*the lower cost Pontoon Pump Station on Awoonga Dam scores a significantly lower rating. The reason is that the pontoon pump station does not mitigate risks associated with Awoonga Gladstone pipeline failure and more widespread risk that may impact Awoonga Dam area such as electrical power supply failure and the loss of road access during flooding. In addition as discussed above, the pontoon creates additional risks such as operability during flooding, debris impacting the floating pipeline from the pontoon to the shore and operational risks".*

In our opinion the Pontoon Pump Station is a preferred solution for the reason that GAWB will have access to a larger amount of storage and be able to undertake longer duration maintenance activities, as identified in the Report for Awoonga Dam - Dam Maintenance Requirements and Effect on Reliability of Supply (GHD, May 2010). It will also allow GAWB to group maintenance activities that would be reasonable to carry out consecutively once the single point of failure assets have been dewatered, thereby lowering risk of future failure. All of the above activities listed within Table B.4 could be undertaken if the Pontoon Pump Station option was installed. The design of the connection point from the Pontoon Pump Station to the transfer pipes between Awoonga Dam and Toolooa Reservoir (parallel DN700 & DN1440 pipes) would have to consider appropriate valves to allow refurbishment of the DN2000 delivery pipe from GAWB pump station to the transfer pipes to be undertaken.

The preferred Pontoon Pump Station option is discussed further in Section B.8.2, including our response to the key challenges of securing and operating the Pontoon Pump Station.

B.6.2 Project delivery

A project plan for the feasibility study of the storage was developed by GAWB in April 2010. We have not sighted a project plan for the actual delivery of the project. Given that the majority of expenditure for the project is due to be undertaken in 2016/17, we would expect a project plan to have been developed at this stage.

The *Capital Expenditure Review – QCA* identifies two critical actions, with uncertain timeframes and implications, for the delivery of the project, being:

- Development approval from Gladstone Regional Council involving and number of State concurrence and advice agencies
- Relocation of an 11 kV electricity line from the ponded storage area

The *Capital Expenditure Review – QCA* states: *"Whilst the above actions hold significant uncertainty there has been a pre-consultation meeting with Gladstone Regional Council about the matter and there do not appear to be significant hurdles at this time."*

No further details regarding the timing of the works or the proposed delivery methodology have been provided. The project plan for the feasibility study states that *"GAWB's procurement decisions are carried out in*

accordance with the stated objectives in the Queensland Government State Procurement Policy." We understand that this will apply for the delivery of the works.

B.7 Standards of service

The Concept Design Report outlines a number of relevant Australian Standards, relevant referenced international standards and guidelines that elements of the works will be carried out in accordance with. These include:

- AS/NZS 1170 - Structural Design Actions
- AS 4678 - Earth Retaining Structures
- AS/NZS 2566.1 - Buried Flexible Pipelines
- AS/NZS 4087 - Metallic Flanges for Waterworks Purposes
- AS 2758 - Aggregates and Rock for Engineering Purposes
- AS 3600 - Concrete Structures
- AS 5100 - Bridge Design
- AS/NZS 2280 - Ductile Iron Pipes and Fittings
- ANCOLD guidelines
- USCOE Engineering Manual, EM1110-2-2007 - Structural Design of Concrete Lined Flood Control Channels
- Tyco Water 'Ductile Iron Pipeline Systems Design Manual'
- USBR Guidelines(1992)
- Filters for Embankment Dams Best Practices for Design and Construction, FEMA

We understand that these will be carried through to the detailed design. We these standards to be appropriate for the works to undertaken. Whilst we have seen no documentary evidence to enable us to state categorically that GAWB's design is compliant, from other evidence we have seen on capital construction projects, we draw the conclusion that GAWB adopts good practice and hence we expect that necessary legislation and guidelines will be adhered to.

B.8 Project cost

B.8.1 Offline storage option

The following commentary is provided on the capital costs of the offline storage option, as this was the proposed solution from GAWB. Commentary on costs for alternative options is provided in subsequent sections. A capital works cost estimate was provided for the project, as outlined in Table B.5.

Table B.5: Capital works cost estimate (GAWB, 31 January 2014)

Aspect	Value ($)
Preliminary and general	385,000
Dam civil works	9,848,079
Pump station civil structural	1,566,800
Pipework and valves	963,000
Pumps and motors	700,000
Electrical	1,955,000
Miscellaneous	230,690

Aspect	Value ($)
Subtotal	15,648,569
Contingency (@ 30%)	4,694,571
Total	**20,343,140**

The capital works cost estimate for the works was prepared by a consultant for GAWB. It is understood that GAWB does not have a standardised cost estimation procedure that they tend to use consultants for this activity. Given that a consultant experienced in this field will often have several similar or related projects from which to develop cost estimates, we consider GAWB's approach of using consultants for cost estimates, given GAWB's size, to be appropriate. The basis for the unit rates used in developing the estimate was not provided.

Insufficient information has been provided to allow us to develop an order of magnitude (-20%, +40%) cost estimate for the works. We have instead reviewed the unit rates or lump sum values used for the development of the capital works cost estimate to determine whether they are reasonable. Overall, based on our understanding of works, the total cost is considered to be low. The cost may be appropriate but more detail on the design and the basis for the rates are required to make this assessment. Our commentary is based on a range of information sources including a compilation of previous projects and published data from Rawlinson's Australia Construction Hand Book. More detailed commentary includes:

- No basis for the rates used has been provided; clarification regarding the basis for all of the rates should be provided
- Without drawings it is difficult to confirm the scope of works is adequately covered
- The sum allowed for preliminaries and generals seems low. Typically for a dam project the preliminaries and generals would be in the order of 12-20% of the project cost. A number of items that could be included in the preliminary and generals appear to be allowed for under miscellaneous. The combined preliminaries and general and miscellaneous costs equal approximately 4% of the total project cost
- Overall the total cost for the dam seems low. The cost may be reasonable but more detail on the design and the basis for the rates would be required to make this assessment. We consider that unit rates used are a mixture of in line with our experience, higher than would be expected and lower than would be anticipated. It is noted that these rates are dependent on a number of factors and further information would be required to make an informed assessment. A number of the items are lump sum values, i.e. the spillway and it is not possible to assess the proposed costs based on the information provided
- The total costs for the pump station and pumps seem reasonable and in line with our expectations
- The total cost for the pipework and valves seems low. We consider that unit rates used are a mixture of in line with our experience, higher than would be expected and lower than would be anticipated
- Overall, the total cost for the electrical work seems reasonable. We consider that the costs for the high voltage switch board and VFDs, cabling, control and instrumentation, and installation are reasonable and in line with our experience. The cost for the 415 V medium switchboard is higher than we would expect from our experience, while the cost for the auxiliary transformer is lower than we would have anticipated
- The total cost the miscellaneous items seem reasonable
- A contingency allowance of 30% was applied to the direct costs. We consider that given that concept design has been completed and detailed design is almost finished the contingency allowance is excessive. In our experience, the contingency allowance at concept design should be in the order of 20% and at detailed design in the order of 15% (unless a higher percentage is supported by appropriate risk-based analysis)

As the value of the works is in excess of $500,000, we understand that an open tender or expression of interest (or similar) process will be undertaken for the procurement of the works. At such time the value of the works will be market tested.

We note that the project value outlined in the *GAWB Offline Storage - Capital Works Estimate* (GAWB, 31 January 2014) varies from that outlined in the *Reconciliation of capex variance identified by Jacobs* (GAWB, 22 October 2014) as outlined in Table B.6.

Table B.6: Offline Storage and Repump Station project proposed capex ($'000)

Source	Previous years	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Reconciliation of capex variance†	622	220	21,106				**21,948**
Capital works cost estimate^			20,343				**20,343**

† Reconciliation of capex variance identified by Jacobs (GAWB, 22 October 2014)

^ GAWB Offline Storage - Capital Works Estimate (GAWB, 31 January 2014)

It is noted that there is approximately $760,000 difference, if previous years are excluded. No details have been provided to explain this difference.

B.8.2 Pontoon pump station option

The capital cost for the Pontoon Pump Station was developed in Conceptual Design Report Standby Storage/Pumping System (Aurecon, July 2010).

Table B.7: Pontoon pump station proposed capex

Item	Description Amount	Cost ($)*
1	Preliminaries	145,000
2	Steelwork	512,325
3	Anchors and winches	251,550
4	Pumps and motors	395,000
5	Pipework and valves	3,584,405
6	Control building & civil works	159,710
7	Electrical works	1,086,220
8	Engineering, procurement & construction management	718,705
9	Miscellaneous	757,661
	Subtotal (items 1 to 9)	7,610,576
	Contingency 30%	2,283,173
	Total (best case)	**9,893,748**
10	Provisional cost items	375,000
	Subtotal (items 1 to 10)	7,985,576
	Contingency 30%	2,395,673
	Total (worst case) with pc items	**10,381,248**

Source: *Conceptual Design Report Standby Storage/Pumping System* (Aurecon, July 2010)

Using CPI to escalate rates to 2014 dollars[5] gives an updated cost of $11.37 million for the worst case scenario, as shown below.

[5] CPI for Brisbane for December 2010 97.4, December 2014 106.7

Table B.8: Escalation of 2010 Pontoon Pump Station proposed costs

Year	Description Amount	Cost ($)
2010	Total (best case)	9,893,748
2014	Total (best case)	10,838,428
2010	Total (worst case) with pc items	10,381,248
2014	Total (worst case) with pc items	11,372,476

Insufficient information has been provided to allow us to develop an order of magnitude (-20%, +40%) cost estimate for the works described in the Conceptual Design Report Standby Storage/Pumping System (Aurecon, July 2010). Jacobs brief review of this report noted key risk items as discussed below.

We note that the Conceptual Design Report Standby Storage/Pumping System (Aurecon, July 2010) reviewed was watermarked as a draft copy and was incomplete, with key sections being labelled as '*to be completed following peer review and risk assessment*'. Also, the copy of the report available for review did not include key appendices, including detailed cost estimates and CAD drawings of the proposed pontoon system.

Within this report an anchorage system is proposed for the pontoon based pump station on a series of one or two anchors and clump weights, similar to that being used at Eungella dam. The conceptual design report also notes that the Eungella dam pontoon was lost over the spillway during a flood event. Whilst little information regarding the loss of the Eungella dam pontoon is available, Jacobs assumes that the most likely cause of failure would be due to failure of the mooring restraint system for the pontoon, at high water levels.

With the pontoon proposed for Awoonga dam having a net displacement of up to approximately 79 tonnes, we accept that there is a significant risk of damage to the spillway (and any other downstream infrastructure) and associated increased risks to the dam's integrity, should the pontoon break free of its moorings. Due to the consequence of the risk of pontoon restraint system failure being materially significant, Jacobs has reviewed the mooring system design to evaluate if it is technically possible to improve the mooring system, whilst not incurring excessive costs, to adequately mitigate the risk to the dam infrastructure such that an event which would detach the pontoon from its moorings would also be the level of event that would equally compromise the dam in its own right. We have therefore undertaken a high level design and order of magnitude cost assessment for a pontoon restraint system with a high level of reliability and robustness when subject to relevant design conditions, including the required range of water levels, current and wave actions.

It is noted in GAWB's (initial) consultant's report that the proposed anchorage system must be suitable for restraining the pontoon, with water levels variations between RL 26 m (Drought restrictions) and RL 43 m (nominal Q10 flood level). This large water level variation posed significant difficulties for the design of a suitable pontoon restraint system as proposed by GAWB's consultants. Long lengths of mooring chains would be required, along with numerous clump weights to appropriately restrain the pontoon. Such a system can result in significant pontoon movement, particularly at lower water levels, as the chains become slack. This pontoon movement must be suitably catered for by flexibility in the connecting 'floating' pipeline, which is noted in Aurecon's report as being a single OD800 PE100 PN12.5 pipeline, with an internal diameter of 676 mm. Careful design of the mooring system proposed, and indeed any mooring system therefore needs to be undertaken to ensure that this connecting pipeline is not damaged due to pontoon movements, and that the pontoon is suitably restrained at all design water levels, currents and wave states. The suitability of such a mooring system, as proposed by Aurecon, is difficult to quantify and its reliability is, as rightly noted by GAWB, debatable.

Subsequently, GAWB submitted a second consultant's report – in response to our draft report – which stated that at various operating locations the pontoon would be moored in water with a depth of RL16 m up to RL 48 m reflecting range. However, the CDM Smith report stated that anchoring the pontoon was not viable from a cost perspective or a work place health and safety risk potential. In response to CDM Smith's report, we have developed a concept design that addresses both of these concerns.

On health and safety, we consider that the additional risk can be managed by appropriate access design (based on maritime design principals) and appropriate operational procedures and training implemented by GAWB. We consider it achievable to for a water utility to develop safe working practices for working over water. Moreover, we do not consider it necessary to operate the Pontoon Pump Station during adverse weather conditions.

In relation to securing the pontoon, in undertaking our review we have developed an alternative pontoon restraint system for consideration in any further investigations. The pontoon is restrained by two vertical tubular steel piles driven into the dam bed. This system is a commonly used approach to pontoon restraint and provides a very high degree of general robustness, particularly when compared to the (above) consultants' contemplated mooring systems.

Our concept has taken cognisance of the GAWB advised requirement for dam infrastructure to be compliant for all flood levels up to a dam capacity, currently RL53 meters and, RL 56 meters by the year 2035. That is, we have taken into account the requirement, as advised by GAWB, for structures proximate to the dam to be compliant with an up to 1 in 450,000 year event (RL56).

This has been achieved by use of steel piles driven into the bed of the dam. Given that the most significant cost element of such a pontoon restraining system is the mobilising of the pile-driving barge to the dam, the cost of suitable piles with required dimensions (i.e. height, diameter and wall thickness) is likely not material compared to the overall project costs. Indeed, it would require only marginal increase in cost to increase the number of piles to four or six, thereby exceeding the above mentioned compliance requirements. That said, we would also recommend that the design be such that, in advance of a significant event, the Pontoon Pump Station and floating pipelines are capable of being withdrawn from the dam and be secured above the flood level. Alternatively, and perhaps preferable, if a suitably designed slipway was installed, the Pontoon Pump Station could be kept permanently above the flood level and deployed as required for maintenance of single point of failure assets. In this respect, it would be impracticable and indeed unnecessary to operate the Pontoon Pump Station during flood events and hence, excessive WH&S procedures to enable such are not required.

In summary, and drawing on our maritime and port engineering expertise, we consider that such a system, when fully engineered will meet, if not exceed the above stated dam safety compliance requirements.

Jacobs' preliminary estimates indicate, therefore, that two pontoon restraint piles of approximately 610 mm in diameter (of approximately 7.5 tonnes each) are considered suitable, from our high level analysis and knowledge of marine mooring systems, to provide pontoon restraint to mitigate the stated risk of the pontoon freeing its moorings and compromising the dam. It is important to note that this is based on a range of assumptions which we have had to make, including design currents and wave induced forces on the pontoon, dam bed levels and geotechnical conditions.

Whilst the fabrication/ supply cost for these piles are not considered to be excessive, the construction costs are potentially the major component costs due to the requirement to mobilise a crane barge for pile driving. Within GAWB's consultant's report it is noted that a "pontoon" type crane is hired for maintenance of the Eungella dam pontoon, in order to lift heavy items on/off the Pontoon Pump Station. Whilst mobilising this construction equipment to the Awoonga dam may be a significant expense, it is possible that a similar style "pontoon crane" as that used at the Eungella dam by SunWater be employed for these works. Due to the precedence of mobilisation of a "pontoon" crane to a similar facility, at not excessive cost, we consider that the constructability of a piled pontoon restraint system is practical and not excessively expensive.

A piled pontoon restraint system may also be designed such that it does not impede the removal of the pontoon from the guide piles during larger flood events and for maintenance operations. This could be achieved by using articulated roller guides on the sides of the pontoon that could be unbolted and pivoted clear of the restraint piles. The operation of a piled restraint system is also less sensitive to environmental loadings, such as flood levels, currents and waves, further reducing its risk profile that the chain system contemplated by GAWB's consultants.

We consider that a piled mooring restraint system is an appropriate solution, subject to further and more detailed engineering evaluation that mitigates, satisfactorily, the potential risks of failure of an anchor/mooring

pontoon restraint system. We therefore recommended that such a system be investigated further in future studies, should the Pontoon Pump Station system be selected for further development. We therefore consider that the Pontoon Pump Station option is capable of construction such that it will not present an unacceptable risk to dam safety.

It is noted that GAWB's initial consultants' capital cost development makes an allowance of $251,550 for 'Anchors and Winches' which is built up of:

- Onshore anchors ($66,000)
- Hand winches ($60,000)
- Cables and Chains ($49,500)
- Installation of anchorage assemblies ($45,000)
- Anchor blocks ($31,050).

We consider that the costs associated with a piled pontoon restraint system would be approximately cost-neutral when compared to the mooring option proposed by GAWB's initial consultant.

CDM Smith's subsequent consideration of costs indicates that their contemplated pontoon concept would be approximately $1.7 million more expensive than the initial consultant's estimate. This higher cost allows for VSDs rather than soft-starters ($390,000), an upgrade to the floating walkway ($350,000) and other less material items. We support these suggestions and have added them to our cost estimate (further below).

The increase in cost contemplated by GAWB's consultant does not materially change our view of the capital costs at this concept design stage.

In summary, our concept of a pile pontoon restraint system would provide a very high level of reliability for lateral pontoon restraint, thereby mitigating the risk associated with of a loss of the pontoon over the spillway and the consequential associated risks of damage and any other downstream infrastructure (as occurred at Eungella Dam) for flood events up to those that, in themselves would compromise the dam and or downstream areas. We therefore recommend that a piled pontoon restraint system be further explored, due to its potential for greater water storage than offered by the Offline Storage proposal.

We consider that our maritime design and our preliminary costings are viable.

Notwithstanding our preference for this technical solution, and taking the broader economic regulatory perspective, when the asset lives of the Offline Storage and the Pontoon concept are considered, we note GAWB's submission that the net present value of both projects' costs may be similar.

However, we consider that the assessment of asset life should take into account the duty (use) of the various components of the Pontoon Pump Station. Given that the pumps, motors, VSDs etc of the Pontoon Pump Station will only be required to run infrequently, with appropriate maintenance, and taking into account the effect of operating hours on asset life, the actual asset life of the Pontoon Pump Station will be similar to that of the Offline Storage (subject to detailed analysis) in our view (i.e. in the order of 80 years).

We also recognise that at this stage there is more certainty regarding the cost of the Offline Storage option than the Pontoon Pump Station option, as it has been progressed to a greater level of design.

In summary, therefore, the cost differences may or may not be a driver in selection of options.

However, we consider that the increased storage from the Pontoon Pump Station over the Offline Storage proposal will enable longer duration maintenance work to be carried out on single point of failure. This is a compelling benefit. We consider this makes the Pontoon Pump Station option worthy of further investigation.

In undertaking this concept design and in the absence of specific geotechnical data, we have assumed that the bed of the dam in the area concerned consists of soft to medium penetrable materials that the piles can be readily driven into but with sufficient geotechnical strength to laterally restrain the piles. However, use of thicker wall piles and or larger diameter piles would overcome instances of softer material or harder (rock) material than assumed in our concept design.

Nevertheless, if after a more detailed geotechnical and other investigations, it is determined that the required height, diameter and wall thickness of the piles becomes impractical and or that hard bed rock means piling cannot viably be undertaken, then the Offline Storage system (whilst offering less available storage) would become the preferred technical solution – in the unlikely event that it proves to be more cost effective. We note GAWB is likely to have relevant geotechnical information available from the dam's construction.

B.8.3 Conclusion

Whilst GAWB has stated that the Pontoon Pump Station contemplated previously will not meet its dam safety requirements, we consider that our concept would meet GAWB's RL56 dam safety obligations. We also consider that GAWB is can address its work health and safety concerns (e.g. with access upgrades and operating procedures).

We conclude that the assessment of whether or not this option is efficient (first test) includes the comparison of costs based on the NPV of our technical preference (Pontoon Pump Station), and GAWB's preferred option (Offline Storage). We note GAWB's submission that these NPV costs may well be similar. However, we consider that the assessment of asset life should take into account the duty of the various components. Given that the pumps, motors, VSDs etc of the Pontoon Pump Station will only be required to run infrequently, with appropriate maintenance, and taking into account the effect of operating hours on asset life, the actual asset life of the Pontoon Pump Station will be similar in our view to that of the Offline Storage.

Accordingly, we recommend that our Pontoon Pump Station option be progressed beyond concept to deliver a similarly well-defined cost comparison as for the Offline Storage. These investigations should determine:

- Whether it is technically and economically feasible, as anticipated, based on actual geotechnical information available to GAWB (either from surveys conducted prior to the dam construction or from subsequent core drilling), to install a piled restraint system
- Whether it is possible to address GAWB's stated concerns with respect to development of suitable Work Place Health and Safety systems to access the pontoon via a floating walkway and marine type gang way (with suitable guard rails) as proposed by us. We consider that with the restraining system we propose, there will be no need for GAWB to operate the Pontoon Pump Station during flood events.
- Confirm the feasibility of locating the Pontoon Pump Station on land securely when not required (thereby easing maintenance activity for the pumps) and further mitigating risk arising from 1 in 450,000 year flood events.
- Confirmation that on an NPV basis and taking into account the low duty of the equipment on the Pontoon Pump Station that it remains a lower cost option than the Off Line Storage, noting that the latter will not meet all maintenance requirements.

At this stage, however, for input to the QCA's GAWB pricing model we recommend that the revised cost of our preferred option be adopted, that is, $13.1 million.

B.8.4 Capex trade-offs with opex (substitution possibilities)

No evidence of GAWB's review of capex trade-offs with opex solutions options have been presented. We consider that there is limited ability of non-infrastructure options to meet the key project driver of increased storage in the storage to reduce supply risk.

B.9 Efficiency gains

No efficiency gains have been identified for this project.

B.10 Implications for operating expenditure

The *Conceptual Design Report Standby Storage/Pumping System* (Aurecon, July 2010) assumed the following operating and maintenance costs for the Pontoon Pump Station option in the NPV calculation (at the base year). That is, Aurecon assumed the following costs:

- Electricity: $6,000
- Generating set hire: $87,265
- Divers: $20,000
- Operations: $10,000
- Maintenance: $30,000
- Refurbishment: $582,592.

We consider, however, that the costs will depend on the operating regime. As noted above, given that the Pontoon Pump Station will be operated infrequently, the operating costs will be low. Hence, the above costs will be incurred infrequently during the life of the asset.

B.11 Policies and procedures

A significant number of documents have been provided in support of this project. However, in terms of documentation required under GAWB's standard procedures we have only sighted a project plan for the feasibility study and planning documents and reports. GAWB has stated that it is "not a project" and as such other supporting documents, such a Business Case, have not yet been developed for the project.

Jacobs considers that, given that detailed design is currently being completed, documentation such as the Business Case should have already been developed.

B.12 Assessment of reported expenditure

Table B.9 below identifies the revised capex for the Offline Storage and Repump Station project.

Table B.9: Offline Storage and Repump Station project revised capex ($'000)

Source	Previous years	2015/16	2016/17	2017/18	2018/19	2019/20	Total
GAWB original value			21,106				**21,106**
Jacobs proposed value^			**13,072**				**13,072**
Change to GAWB's submission			**-8,034**				**-8,034**

^This value does not take into account the NPV of the life cycle costs of the two options noting they have different standard asset class lives. However, it is important to adjust the standard asset class lives of; for example, pumps, motors, VSDs and other component assets to take into account the low duty (use) of the Pontoon Pump Station. On making this adjustment, the asset life of the Pontoon Pump Station is likely to be of the same order as for the Offline Storage civil infrastructure i.e. circa 80 years (noting GAWB advised the Offline Storage asset life of 76 years).

We recommend adoption of our revised cost of $13.1 million for the Pontoon Pump Station for inclusion by the QCA in its GAWB pricing model. This includes additional costs / upgrades contemplated by CDM Smith.

B.13 Extrapolation to other projects

As noted above, this project has progressed to detailed design, prior to the customer's willingness to pay being established. We consider that undertaking detailed design prior to establishing the prudency of the project is premature and may lead to unnecessary expenditure. This is discussed further in the main body of the report.

B.14 Summary/conclusions and recommendations

B.14.1 Summary

Table B.10 presents an overview of the findings of the prudency and efficiency of the project.

Table B.10: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Offline Storage and Repump Station project	Prudency		The project does not strictly meet the primary driver (as per the QCA TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' as the project has not been explicitly endorsed by customers. However, Jacobs concurs that there is a need for GAWB to undertake condition assessment and maintenance on critical assets and note that this links to the good practice clause in customer contracts. As such, we find the need for expenditure to be prudent albeit that, regulatory approval under this driver requires customer endorsement.
	Efficiency		Regulatory efficiency is a two-part test: • Firstly whether the regulated entity's preferred option reflects the least cost in terms of the total of capex and opex over the life of the asset whilst providing the greatest utility in terms of the regulatory driver. Therefore, when comparing options with different asset lives we consider the life cycle (or NPV) cost of the various options over the period of the longest life option, together with the extent to which each option delivers on the regulatory driver. An exception is when the regulatory driver has a shorter life than one of the options, in which case the comparison of life cycle costs is limited to the life of that driver. • Secondly, whether the costs proposed by the entity for its preferred option are the costs that would be incurred by a knowledgeable and efficient operator. In view of the two part test, we consider: • That the life of the regulatory driver is not relevant (or limited) in this case. Therefore, the option with the least cost NPV over the life of the longest-life asset that delivers the highest utility per unit of cost will be preferred. We note GAWB's submission that the NPV costs of our preferred technical solution (Pontoon Pump Station) and theirs (Offline Storage) are sufficiently similar to disqualify cost as the deciding factor. The basis of this NPV comparison has not been provided. • We note that our solution delivers more days of storage than the Offline Storage and therefore greater utility. GAWB has submitted a list of maintenance activities that could take over 14 days to undertake, which would not be possible to achieve using the Offline Storage option. In addition, access to a greater storage could allow for several maintenance activities to be undertaken concurrently during the same shut down period resulting in efficiencies; and to provide a larger buffer for unforeseen eventualities. • In summary, our solution is efficient on this first criterion. By comparison, on the first test, GAWB's preferred solution may deliver less utility for a higher capital cost, arguably making it inefficient when compared to our option. • On the second test, we consider that GAWB is a knowledgeable and efficient operator and that, all things being equal, the proposed cost of its preferred solution is efficient. Similarly, our review of GAWB's submitted costs, for our preferred option, supports our view that the Pontoon Pump Station costs are also efficient. Accordingly, our option is efficient on both criteria, whereas GAWB's is partially efficient.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

B.14.2 Recommendations and conclusions

Given that, the regulatory driver of customer approved expenditure to improve service delivery and efficiency is the only available regulatory driver for this project, written customer approval for this project is required in order to enable the project to be determined prudent by the QCA.

We consider that an efficient cost of $13.1 million should be adopted for this project.

Appendix C. South Trees Pipe Bridge structural refurbishment

C.1 Executive summary

The South Trees Pipe Bridge is an existing pipe bridge built circa 1985, to carry two pipelines (one for treated water and the other for raw water) to Boyne Island across the South Trees arm of the Boyne River. The bridge is the sole support for the treated water pipeline that services the Boyne Island and Tannum Sands precincts along with the raw water pipeline that supplies the Boyne Smelter. The project involves the repair of the South Trees Pipe Bridge structure, including reinstatement of protective coatings to pipelines, concrete rehabilitation (bridge structure, pile caps and columns), and protective works to marine support structure (pile wraps and cathodic protection to steel reinforcement).

From our analysis we conclude that the project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in **Table C.1.**

Table C.1: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
South Trees Pipe Bridge Structural Refurbishment	Prudency		The project is assessed as prudent as the primary driver of risk mitigation, which we map onto the QCA regulatory driver of replacement (refurbishment) has been demonstrated. The condition assessment found that the pipe bridge is suffering various forms of corrosion with the risk assessed as 'high'. The project meets the QCA's definition of prudency as it is required as a result of renewal of existing infrastructure, which is in use and useful (i.e. it is required to deliver a regulated service).
	Efficiency		The project is assessed as efficient. The scope of works is appropriate. An independent cost estimate has been developed on GAWB's behalf for the works which is considered appropriate for the current phase of the project. We have undertaken a high level review of the costs and found them to be within our benchmark order of magnitude cost estimates.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

C.2 Project description

The project involves the repair of the South Trees Pipe Bridge structure, including reinstatement of protective coatings to pipelines, concrete rehabilitation (bridge structure, pile caps and columns), and protective works to marine support structure (pile wraps and cathodic protection to steel reinforcement).

The South Trees Pipe Bridge is an existing bridge built around 1985, to carry two pipelines (one for treated water and the other for raw water) to Boyne Island across the South Trees arm of the Boyne River at Gladstone in North Queensland. The bridge is the sole support for the treated water pipeline that services the Boyne Island and Tannum Sands precincts along with the raw water pipeline that supplies the Boyne Smelter.

The sixteen span bridge spans the South Trees Inlet in a North-East to South-West direction. The structure comprises two 415 mm outside diameter (OD) pipes, one each side of the walkway, which are utilised structurally to span between the bridge piers. The steel framed walkway structure comprises two steel 4" deep tapered flange channel section stringers, which are supported from the two pipes via 4" tapered flange channel section hanging beams, positioned at varying centres (maximum spacing 2,550 mm). The walkway structure has handrails both sides, supported from the stringers. The works required for the project have been scoped and the works are anticipated to be completed in 2016/17. We note that this project was not been reviewed by the QCA.

C.3 Proposed capex

Table C.2 tabulates the cost of the proposed cost of the South Trees Pipe Bridge Structural Refurbishment within the 2015 to 2020 budgets.

Table C.2: South Trees Pipe Bridge Structural Refurbishment proposed capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
Capital Expenditure Review *	1,685						1,685
Sample confirmation email (dated 15/10/2014)	1,685						1,685
Donald Cant Watts Corke Cost Estimate		2,237					2,237

* Capital Expenditure Review – QCA, Rev 6 (Cardno, 23 September 2014)**Documentation reviewed**

The key reference documents used for this review are:

- *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- Email - Detail of project cost17-Jul-14
- South Trees Pipe Bridge Condition Assessment 20-Nov-13
- Scoping Document for Costing Purposes 14-Jan-14
- Repairs to South Tree Pipe Bridge - Schematic Design Estimate 14-Mar-14
- Project Justification Form

C.5 Key drivers

The primary driver identified by GAWB for this project is risk which we consider best maps to the QCA regulatory driver of “replacement” (refurbishment). The South Trees Pipe Bridge carries both a raw water main and a potable water main to Boyne Island. There are no alternative water supplies to the island.

A Stage 1 Condition Assessment of the bridge was undertaken in 2013. The condition assessment found that the pipe bridge is suffering various forms of corrosion with the risk of failure assessed as ‘high’. The bridge is deteriorating as a result of the corrosion, making the walkway unusable. The condition of the bridge walkway impacts on GAWB’s ability to access the pipelines for inspection and maintenance. In the long term, deterioration the pipe bridge would also risk the water supply to GRC and QAL.

It is considered that risk mitigation is an appropriate driver for the project as GAWB cannot use the bridge as intended. As such we consider that the project meets the QCA’s definition of prudency as it is required as a result of renewal of existing infrastructure and the infrastructure is necessary to provide a regulated service now and for the foreseeable future. Regulatory obligation is not considered a driver at this point in time as the works have not been specifically directed to be undertaken by a regulatory organisation.

C.6 The scope of works

In this section we highlight whether the selected scope of work is the best (most efficient) means of achieving the desired outcomes after having regard to the options available, including the substitution possibilities between capex and opex, consideration of whole-of-entity and whole-of-sector solutions, and non-network alternatives such as demand management.

C.6.1 Solutions development

According to GAWB's submission, a number of options were considered to address the issue, including:

1) Doing nothing
2) Full or partial replacement
3) Repair of the existing structure

Repair of the existing structure was determined by GAWB to be the most economical option to extend the life of the structure as doing nothing resulted in additional costs being incurred for continued monitoring of the bridge, and full or partial replacement was deemed unnecessarily expensive at this point in time as the existing structure is operational with no severe risk identified.

We understand that a Stage 2 detailed structural condition assessment was proposed to be carried out in the first half of 2014, to more accurately determine the extent of corrosion/deterioration. To our knowledge this has not occurred.

The scope of works, as defined in Vinsi's Scoping Document for Cost Estimate Purposes, includes:

- An impressed current cathodic protection system for the protection of pile caps above water, incorporating discrete anodes
- An impressed current cathodic protection system for selected in-ground and in-water piles
- The protection of selected 750 mm diameter piles between the pile cap soffit, and low mean water level, with a jacketed petrolatum based tape system
- For the water pipes, and 18 no. pile caissons extending above ground, (i.e. not in water), provide a protective coating system

We find the scope of works proposed by Vinsi to be appropriate.

Following our review, we consider the concrete repairs, cathodic protection and column wrapping proposed to be appropriate, given the structure seems to be suffering from significant chloride attack with severe laminar corrosion of piles. We note that the walkway repairs are not included in the scope of this project.

C.6.2 Project delivery

From the Project Justification Form we understand that GAWB planned to use a request for proposal process with four invited tenderers. We have not sighted (nor requested) any further evidence of this process occurring. We note that GAWB is behind the schedule originally recommended by Vinsi. As such, we agree that further deferral of works is not recommended (with the exception of the items of scope identified in Section C.6).

We understand that the last inspection occurred in 2007. We agree with GAWB that more frequent inspection would have had little impact on the works required at this point in time. Given in proposed value of the project, approximately $1.7 million, if the whole scope of works is awarded in one contract we would expect an open tender or EOI process to be adopted.

No details on the proposed delivery has been sighted, i.e. no project plan or business case. Given that the works are schedules to be undertaken in 2016/17 we consider that a project plan and a business case should have been developed at this stage.

C.7 Standards of service

Vinsi's Scoping Document for Cost Estimate Purposes, includes details of the standards of works to be achieved, particularly within its reinforced concrete remedial repair method statement. We consider these standards to be appropriate.

C.8 Project cost

The project costs are based on an independent cost estimate by Donald Cant Watts Corke (DCWC). We understand that the cathodic protection costs included in the cost estimate are based on detailed quotations from industry suppliers.

Reconciliation of the budget against the DCWC cost estimate is shown in Table C.3 below.

Table C.3: Cost breakdown ($)

Element	DCWC Value ($)	Budget Value ($)	Comment
Crack and patch repairs (Over Ground)	148,000	148,000	
Crack and patch repairs (Head Stock)	20,000	20,000	
Crack and patch repairs (Precast Columns)	9,000	9,000	
Crack and patch repairs (Pile Caps)	9,000	9,000	
Impressed current CP	411,000	411,000	
Pile Wraps and Protection	78,000	78,000	
Walkway repairs	127,000		Work completed under a separate project
Replacement valves	19,000		Work completed under a separate project
Water pipe repairs	389,000	389,000	
SUB-TOTAL (Trade Cost) (excl. GST)	**1,210,000**	**1,064,000**	
Preliminaries (18.00%)	220,000	191,520	
Margin (5.00%)	75,000	53,200	
Design Contingency (15.00%)	229,000	159,600	
SUB-TOTAL (Contract Sum) (excl. GST)	**1,734,000**	**1,468,320**	
Construction Contingency (10.00%)	178,000	117,466	
Design & Professional Fees (10.00%)	252,000		Work completed under a separate project
Insurance, Statutory Fees (3.25%)	73,000	47,720	
PROJECT COST - NON CONTRACT WORKS	**503,000**	**165,186**	
Escalation (2.5%)		40,838	
GROSS PROJECT COST (excl. GST)	**2,237,000**	**1,674,344**	

The capital works cost estimate for the works was prepared by a consultant for GAWB. It is understood that GAWB does not have a standardised cost estimation procedure, but that they tend to use consultants for this activity. Given that a consultant experienced in this field will often have several similar or related projects from which to develop cost estimates, we consider GAWB's approach of using consultants for cost estimates, given GAWB's size, to be appropriate.

From our review of the costs, the direct costs appear to be reasonable and in line with expectations. We consider the contingency allowances to appear to be reasonable for the phase of the project as the Stage 2 detailed structural condition assessment has yet to be undertaken, and hence the scope of works is still subject to change. As the value of the works is in excess of $500,000, we understand that, under GAWB's procurement processes, an open tender or expression of interest (or similar) process will be undertaken for the procurement of the works. As such time and assuming sufficient competitive bids are received to demonstrate competition, the value of the works will be market tested.

Based on the information provided to date, we consider that the proposed budget of $1.67 million is efficient.

C.9 Capex trade-offs with opex (substitution possibilities)

No evidence of GAWB's review of capex trade-offs with opex solutions options have been presented to us. Deferring the works is likely to result in increased maintenance costs. However, increased maintenance on its own is unlikely to be a long term viable solution for the pipe bridge.

C.10 Efficiency gains

No efficiency gains have been identified.

C.11 Implications for operating expenditure

We consider that there will be limited implications for operating expenditure as a result of this project as the majority of the works are refurbishments.

C.12 Policies and procedures

We have sighted a Project Justification Form and budget estimate has been developed for this project. This is in keeping with the level of documentation that we would expect to be available at this stage of the project. We anticipate that as the project progresses additional documentation including: Project Plan; Business Case; contract documents and reports; and a Project Closure Report, will be developed.

C.13 Assessment of reported expenditure

Table C.4 below identifies the revised capex for South Trees Pipe Bridge Structural Refurbishment.

Table C.4: South Trees Pipe Bridge Structural Refurbishment revised capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
Original value	1,685						**1,685**
Jacobs proposed value	1,685						**1,685**
Variation (to original value)	0						**0**

C.14 Extrapolation to other projects

Due to the unique nature of the works undertaken at the South Tree Pipe Bridge, we do not recommend that the findings from this report can be extrapolated to other projects.

C.15 Summary/conclusions and recommendations

C.15.1 Summary

Table C.5 presents an overview of our findings of the prudency and efficiency of the project.

Table C.5: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
South Trees Pipe Bridge Structural Refurbishment	Prudency		The project is assessed as prudent as the primary driver of risk mitigation, which we map onto the QCA regulatory driver of replacement (refurbishment) has been demonstrated. The condition assessment found that the pipe bridge is suffering various forms of corrosion with the risk assessed as 'high'. The project meets the QCA's definition of prudency as it is required as a result of renewal of existing infrastructure, which is in use and useful (i.e. it is required to deliver a regulated service).
	Efficiency		The project is assessed as efficient. The scope of works is appropriate. An independent cost estimate has been developed on GAWB's behalf for the works which is considered appropriate for the current phase of the project. We have undertaken a high level review of the costs and found them to be within our benchmark order of magnitude cost estimates.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

C.15.2 Recommendations

We conclude that the project expenditure is prudent and efficient. As discussed above we consider that the efficient expenditure for this capital project is $1.685 million.

Appendix D. Boat Creek expansion

D.1 Executive summary

The project involves establishing an increase to the available storage capacity at Boat Creek. The project is proposed to be undertaken in a number of stages. Stage 1 involves increasing the current capacity by creating a new reservoir immediately to the north of the existing reservoir and dewatering and cleaning out of material from the existing Boat Creek reservoir; while Stage 2 involves the expansion of the existing reservoir to the south. It is to be noted that this review only covers the cleaning of the reservoir and the Stage 1 expansion.

The project has not been previously reviewed by the QCA.

From our analysis we conclude that the project is **prudent** and **partially efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table D.1.

Table D.1: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Boat Creek Expansion	Prudency		The project is assessed as prudent. The need for the project has been demonstrated; the increase of storage at Boat Creek reservoir is necessary to meet GAWB's internal objective to maintain a minimum of 24 hours supply in all parts of the delivery network. However, the primary driver (as per the QCA's TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' has not been demonstrated. We strongly recommend that GAWB seeks and obtains written customer approval for this project prior to proceeding to create a direct link to the regulatory driver.
	Efficiency		The project is assessed as partially efficient. The methodology used for the selection of the preferred option is not robust and as such appropriateness of the scope of the preferred option has not been demonstrated. Whilst we agree that designing infrastructure to cater for future demand is appropriate, we have not been provided with documentation supporting the potential growth in demand or setting out how the required size of the storage has been determined. As the costs have been based on a storage size larger than has been demonstrated to be required, the costs currently included in the budget are considered by us to be excessive and hence are not efficient. In our recommended costs we have allowed for 10 ML storage to maintain a minimum of 24 hours supply in all parts of the delivery network.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

D.2 Project description

The project involves establishing an increase to the available storage capacity at Boat Creek. The project is proposed to be undertaken in a number of stages. Stage 1 involves increasing the current capacity by creating a new reservoir immediately to the north of the existing reservoir and dewatering and cleaning out of material from the existing Boat Creek reservoir; while Stage 2 involves the expansion of the existing reservoir to the south. It is to be noted that this review only covers the cleaning of the reservoir and the Stage 1 expansion.

This project was not been previously reviewed by the QCA.

D.3 Proposed capex

Table D.2 shows the proposed cost of the Boat Creek Expansion project within the 2015 to 2020 budgets.

Table D.2: Boat Creek Expansion project proposed capex ($'000)

Source		2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
Sample confirmation email (dated 15/10/2014)				3,986				**3,986**
Capital Expenditure Review *			3,126					**3,126**
Reconciliation of capex variance◆	Stage 1		3,126					**3,986**
	Refurbish & Secure Land		860					
QCA Project Estimates†	Stage 1		2,917					**3,186**
	Refurbish		269					

* Capital Expenditure Review – QCA, Rev 6 (Cardno, 23 September 2014)

◆ Reconciliation of capex variance identified by Jacobs (GAWB, 22 October 2014)

† QCA Project estimates 2014/15 - Boat Creek Reservoir (Aurecon, 30 January 2014)

In response to our RFI, GAWB provided a breakdown of expenditure for the project. This breakdown includes separate line items for Stage 1 of the expansion works ($3,125,609), the refurbishment of the reservoir and securing the land for the reservoir ($860,462).

We note that *QCA Project estimates 2014/15 - Boat Creek Reservoir* (Aurecon, 30 January 2014) and the breakdown of project expenditure do not align. The difference being that the current GAWB estimate is some $800,000 higher than the 2014/15 QCA estimate. We consider that the difference may be partially attributed to the costs associated with the purchase of the land not being included in the *QCA Project Estimates* as these cost were associated with only specific work to be undertaken. As such Jacobs accept the whole $860,000, however a breakdown of these costs, and confirmation of the land costs, would be beneficial.

D.4 Documentation reviewed

The key reference documents used for this review are:

- *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- *Strategic Water Plan*, GAWB, November 2013 (GAWB, November 2013)
- *Project Justification Form - Boat Creek Expansion Stage 1* (GAWB, April 2014)
- *QCA Project estimates 2014/15 - Boat Creek Reservoir* (Aurecon, 30 January 2014)
- *Reconciliation of capex variance identified by Jacobs* (GAWB, 22 October 2014)
- *Water Delivery Network Risk Assessment - Raw & Treated Water Scenarios, Final* (Hunter Water Australia, September 2012)
- *Email Re: Emergency Supply* (30 October 2014)
- *Water Supply Code of Australia, WSA 03-2011, Version 3.1* (WSAA, April 2011)

D.5 Key drivers

The primary driver identified for this project is risk of supply failure and hence the regulatory requirement of meeting contracted customer supply standards. GAWB has an objective to maintain a minimum of 24 hours supply (risk storage) in all parts of the delivery network. This is highlighted in GAWB's submission as a driver for the project which states: '*Current demand levels identify the need for additional risk storage within the raw water network of the North Industrial pricing zone.*' The Boat Creek Reservoir currently has a storage capacity of 29 ML which is less than 24 hours supply. GAWB's *Strategic Water Plan* (GAWB, November 2013) sets a network design standard of a minimum of 24 hours available risk storage at all times.

We consider that the provision of 24 hours storage capacity is reasonable and is consistent with, if on the high side of, the typical storage capacities for a surface reservoir supplying a local water distribution system of 8 to 24 hours, as outlined in the WSAA Water Supply Code (WSAA, April 2011).

We note that Section 29.1 of Part H in the *Water Supply Contract (with delivery)* outlines GAWB's ability to apply water restrictions in the event (or anticipated event) of a number of situations including: a service interruption within the System or Delivery System; an infrastructure breakdown within the System or Delivery System; or any Emergency. Regardless, we still consider that maintaining 24 hours storage is reasonable.

At the meeting with GAWB on the 29th October 2014 (Capex Conclave, 2014), GAWB stated that their customers' willingness to pay is being tested through their *2015 Price Monitoring Investigation Submission*. In addition, GAWB stated that the Boat Creek Expansion is not currently a project and will not become a project until it is endorsed by its customers. GAWB considers no negative responses to the *2015 Price Monitoring Investigation Submission* to be an acceptance of the customers' willingness to pay. We do not concur with GAWB on this matter as silence should not, as a general principle, be capable of being taken as implicit approval.

The QCA's definition of prudency is that a project achieves an increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies. Jacobs considers that the project does not strictly meet this definition as the customers' willingness to pay has not been demonstrated.

D.6 The scope of works

D.6.1 Solutions development

The *Water Delivery Network Risk Assessment* (Hunter Water Australia, September 2012) discusses two options:

- An online storage reservoir with a top water level of approximately 70-80 m.
- An offline storage (similar in operation to Boat Creek reservoir) and booster pumping station (Hunter Water Australia, September 2012).

The report notes that for, both options, there are many customers downstream of the potential storages which are vulnerable to a pipeline failure. A number of the pros and contras for the two options are discussed in the report. However no recommendations as to the preferred option are made in the report.

According to GAWB's submission, options available for additional storage in the North Industrial pricing zone are:

- A new reservoir at Aldoga, or
- An expansion of the Boat Creek Reservoir.

The recommended option according to GAWB's submission was a staged expansion of Boat Creek Reservoir. No justification has been provided to us by GAWB to support for this decision.

The scope of the project is as detailed below:

- Dewatering and clean out of material from the existing Boat Creek reservoir
- Stage 1 Expansion – doubling the current capacity by creating a new reservoir immediately to the north of the existing reservoir including:
  - Excavation and placement of material to create the new reservoir
  - Placement of new PE liner and concrete lip around edge of new reservoir
  - Relocation of the existing overflow pit and outlet pipe

- Placement of a new pipe to connect the new reservoir to the existing reservoir (Aurecon, 30 January 2014)

There is conflicting information in the documentation provided by GAWB as to the final storage capacity of the Boat Creek Reservoir on the completion of Stage 1. GAWB's submission (GAWB, September 2014) states: *"An increase in available storage to 38.5ML (i.e. new storage of 9.5ML) is required to provide a minimum of 24 hours supply (risk storage) for the North Industrial pricing zone"*. However, the *QCA Project Estimates* (Cardno, 23 September 2014) states: *"Stage 1 Expansion – doubling the current capacity by creating a new reservoir immediately to the north of the existing reservoir"*. The *QCA Project Estimates* (Aurecon, 30 January 2014) does not state the volume of the new reservoir.

Based on the information provided, that is, the current 29 ML storage has 18 hours storage capacity, a new 9.5 ML storage will provide approximately six hours additional storage capacity, giving a total storage capacity of 24 hours. If the total storage is to be doubled, i.e. a new 29 ML storage is constructed, this will provide approximately 18 hours additional storage capacity, giving a total storage capacity of 36 hours, 12 hours more than required, under GAWB's standards, for risk storage.

According to the *Email Re: Emergency Supply* (GAWB, 30 October 2014) the sizing of the reservoir was based on expected future growth in customer demand and value for money, as stated below:

> *"Also it is expected than any future industrial development would occur in the northern zone. Therefore it would not be prudent to only expand Boat Creek to achieve minimum current required demand but to allow for future demands (e.g. future staged WICET, of other mooted developments in northern Zone.*
>
> *The "doubling" of the capacity of the Boat Creek storages was targeted as this was thought to be an efficient expansion in terms of ML storage per $."*

We have not sighted evidence of growth in the zone supplied by this offline storage. We note that GAWB's submission states:

> *"The only existing customer forecasting gradual demand growth over the 2016–2020 period is GRC. GRC's growth forecasts are included in GAWB's demand forecast.*
>
> *New industrial customers have significant lead-times. GAWB has no current enquiries from potential customers that would require a water supply within 5 years."*

Subsequent to the draft report, GAWB provided additional commentary on the need for the larger storage. GAWB stated:

> *"GAWB considers the 10ML expansion as NOT efficient. Building long term infrastructure requires a longer term design horizon otherwise it results in a number of small inefficient augmentations. A 10 ML expansion to get 39ML total storage would only address the current 24 hour demand. In particular, if a customer were to seek an additional 1,000MLpa supply, then GAWB would not achieve 24 hour redundant supply i.e. we would be behind design intent even before design has started or construction completed. I also note that as of this week, we have received further information from Rio Tinto Yarwun that their usage within this North Industrial Area will increase by approximately 800ML per annum. This provides one example of how a stepped change in demand can impact the storage requirements and why an efficient 'buffer' is needed. Please note that GAWB's demand forecasts will also be impacted subject to Rio Tinto's confirmation of additional demand which will likely happen over the coming 1-2 months.*
>
> *A 30ML increase (59ML total) would address an approx. 15 years forecast demand/ design horizon for Mt Miller Pipeline supply area."*

We consider that insufficient evidence has been provided to demonstrate that a robust options investigation and analysis has been undertaken for the selection of the preferred option. Further, whilst we agree that designing infrastructure to cater for future demand is appropriate, we have not been provided with documentation

supporting the potential growth in demand or setting out how the required size of the storage has been determined. As such, it will be necessary for us to view documented evidence of the 15 year forecast demand/ design horizon for Mt Miller Pipeline supply area that supports increasing existing storage capacity beyond the current required capacity in order for us to consider the project prudent. Further, no evidence of a comparison (i.e. capex, opex, NPV) or ranking (cost and non-cost) of the options has been provided to us.

Subsequent feedback to a revised draft report states that "i*n relation to the efficiency of the project, GAWB notes that:*

- *the sizing of the proposed infrastructure and forecast cost is based upon a credible planning scenario as opposed to a prediction of future events;*
- *the alternate sizing proposed by Jacobs will not meet the desired reliability standard of 24 hours of risk storage; and*
- *a business case will be prepared prior to commencement of the project which will consider (amongst other things):*
    - *outlook for customer demand;*
    - *construction costs, future construction costs, likely future augmentations needed, and available construction synergies tested through a procurement process; and*
    - *a Net Present Value analysis which will determine the most appropriate augmentation size considering the relevant factors."*

In response, we support the use of a credible planning scenario to size the storage. We note that GAWB has provided details on its overall demand forecast in its submission. However, we are unable to directly link this to the storage profiles shown in *Response to Jacobs Draft Report – Boat Creek Expansion*. We have not been provided with any details or assumptions on which the planning scenario is based for the North Industry area.

We note that GAWB calculate that the 10ML storage would only result in 23.4 hours of storage. We believe that the increase in storage volume required is relatively small and is unlikely to have a material impact on project costs.

We support the production of a business case, complete with the items as stated by GAWB. When complete, this should clearly establish the drivers for the project and validate the sizing of the storage. Without this information to review, it is challenging for Jacobs to assess whether the sizing of the storage is appropriate.

At the meeting with GAWB on the 29th October 2014 (Capex Conclave, 2014), GAWB stated that the Boat Creek Expansion is not currently a project and will not become a project until it is endorsed by its customers. As such neither a Project Plan nor a Business Case has been developed for the project. However, we understand that detailed design is currently being completed for the project. We consider that undertaking detailed design prior to establishing the prudency of the project is premature and may lead to unnecessary expenditure.

We recommend that GAWB undertakes customer consultation as planned, including discussions regarding future demands, to enable a substantiated case for the project to be developed.

D.6.2 Project delivery

The project will be undertaken in the following phases: cleaning of the existing reservoir followed by the Stage 1 expansion. The cleaning of the existing reservoir will be undertaken an external contractor prior to construction and civil works to enlarge storage capacity of the Boat Creek reservoir. The existing reservoir will remain in service while the new reservoir is constructed.

The proposed phasing is reasonable in order to maintain supply and minimise risks during construction.

No details have been provided to us regarding the standard that the works will conform to. In Australia, as with most other countries the design and construction of a reservoir should be compliant with the requirements of applicable legislation and guidelines, such as:

- *Water Act 2000*
- *Water Supply (Safety and Reliability) Act 2008*
- ANCOLD guidelines
- Guidelines on Acceptable Flood Capacity for Water Dams
- Queensland Dam Safety Management Guidelines
- Guidelines for Failure Impact Assessments for Water Dams

Whilst we have seen no documentary evidence to enable us to state categorically that GAWB's design is compliant, from other evidence we have seen on capital construction projects, we draw the conclusion that GAWB adopts good practice and hence we expect that necessary legislation and guidelines for dam construction will be adhered to.

D.7 Project cost

Order of magnitude budget estimates (±30%) have been developed for the project. The following table presents an overview of these estimates. We have not sighted information on the costs associated with the land acquisition.

Table D.3: Budget cost estimate ($) (Cardno, 23 September 2014)

Aspect	Capital cost estimate
Reservoir clean-up	269,300
Stage 1 Expansion	2,917,000
Total	**3,186,300**

We consider that, as the cost estimate for the reservoir cleaning has been based on a recent quotation, the order of magnitude cost estimate for this are in line with market rates and are appropriate for a budget estimate. As the project value is estimated to be greater than $10,000 but less than $250,000, it is understood that at least three quotations will be obtained for the works prior to award.

The budget cost estimate for Stage 1 of the expansion works has been prepared by a consultant for GAWB. It is understood that GAWB does not have a standardised cost estimation procedure that they tend to use consultants for this activity. Given that a consultant experienced in this field will often have several similar or related projects from which to develop cost estimates, we consider GAWB's approach of using consultants for cost estimates, given GAWB's size, to be appropriate. However, the basis for the unit rates used in developing the estimate has not been provided to us.

In order to benchmark GAWB's order of magnitude costs, we have developed a 2014 cost base order of magnitude (-20%, +40%) cost estimate for the construction of a new 10 ML HDPE lined storage (to be comparable with the 9.5 ML storage for 6 hours additional storage capacity) and a 30 ML HDPE lined storage (to be comparable with the 29 ML storage for doubling storage capacity). Our cost estimates are based on recent unit rates and projects undertaken by us. In developing the cost estimate, a project management allowance of 15% of direct costs and a contingency allowance (for variations due to construction unknown at this stage) of 10% of direct costs have been adopted.

Table D.4: Jacobs cost estimates for storages ($)

Element	10 ML HDPE lined storage	30 ML HDPE lined storage
Capex	$1,631,000	$2,226,000
Project Management & Contingency (@ 25%)	$408,000	$557,000
Total	**$2,039,000**	**$2,783,000**

Note: Values rounded to nearest thousand.

A comparison between GAWB's and our cost estimates are presented in the Table D.5 below.

Table D.5: Comparison of storage development cost estimate ($)

GAWB	Jacobs	Difference	
		Value	Percentage
$2,917,000	$2,039,000	-$878,000	-43%
	$2,783,000	-$134,000	-5%

Our cost estimate for a 10 ML storage is lower (by more than 40%) than GAWB's cost estimate, but our costs are similar for the 30 ML storage. There is approximately $750,000 difference between costs of the 10 ML and 30 ML HDPE lined storages. We consider that, although the cost for a larger storage is more efficient on a $/ML basis (approximately $200,000/ML for 10 ML storage versus approximately $93,000/ML for 30 ML storage), increasing the size of the storage over that needed for the foreseeable future needs to be justified in order for the option of developing a larger storage than needed to be considered efficient.

Given the above we consider that, without an understanding of the timing of the need for the additional 20 ML storage, that is the projected changes in customer demand, the efficiency gains and value for money of constructing the larger storage in the next regulatory period has not been demonstrated. We consider that GAWB should undertake further consultation with its customer to determine their willingness to pay for:

1) 24 hours of redundant supply, and

2) Future unconfirmed potential growth in demand (and request forecast demand projections).

If customer willingness to pay for 24 hours of redundant supply and a larger storage is obtained, we would consider GAWB's proposed 30 ML to be efficient. In addition, GAWB has the ability to retrospectively apply for increased costs to be included in the RAB, should its Business Case demonstrate that based on consideration of customer demands, construction costs and NVP assessment, a larger storage is a more efficient solution.

As the value of the works is in excess of $500,000, we understand that, under GAWB's procurement processes, an open tender or expression of interest (or similar) process will be undertaken for the procurement of the works. As such time and assuming sufficient competitive bids are received to demonstrate competition, the value of the works will be market tested.

Based on the information provided to date, we consider that $2.90 million, of the $3.99 million, is efficient. This sum is comprised of $2.04 million for the new storage and $0.86 million for the refurbishment of the existing storage and for the securing of land.

D.8 Capex trade-offs with opex (substitution possibilities)

No evidence of GAWB's review of capex trade-offs with opex solutions options have been presented to us (such as GAWB funded client demand management measures to reduce the storage volume required). However, from our experience, we consider that the impacts of practical and economic demand management will not be significant enough to negate the need for additional storage.

D.9 Efficiency gains

No efficiency gains have been identified for this project.

D.10 Implications for operating expenditure

It is anticipated that there will be an increase in operating expenditure associated with the completion of this project as there will be additional storage capacity to be maintained. However, there is potential for the storage to reduce other maintenance costs by providing a bigger window of opportunity to undertake preventative maintenance and or to respond to and address infrastructure breakdowns upstream of the storage facility.

D.11 Policies and procedures

Due to the early stage of the project only a budget estimate and a Project Justification Form have been provided in support of the project which is in keeping with the level of documentation that we would expect to be available at this stage of the project. We anticipate that as the project progresses additional documentation including: Project Plan; Business Case; planning documents and reports; contract documents and reports; and a Project Closure Report, will be developed.

D.12 Assessment of reported expenditure

Table D.6 below identifies our recommended revised capex for the Boat Creek Expansion.

Table D.6: Boat Creek Expansion revised capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
Original value		3,986					**3,986**
Jacobs proposed value		2,899					**2,899**
Variation (to original value)		-1,087					**-1,087**

D.13 Extrapolation to other projects

This section is to be completed once all capex projects have been reviewed.

D.14 Summary/conclusions and recommendations

D.14.1 Summary

Table D.7 presents an overview of the findings of the prudency and efficiency of the project which we assess as being **prudent and partially efficient**.

Table D.7: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Boat Creek Expansion	Prudency		The project is assessed as prudent. The need for the project has been demonstrated; the increase of storage at Boat Creek reservoir is necessary to meet GAWB's internal objective to maintain a minimum of 24 hours supply in all parts of the delivery network. However, the primary driver (as per the QCA's TOR) of 'increase in the reliability of supply that is explicitly endorsed or desired by customers or external agencies' has not been demonstrated. We strongly recommend that GAWB seeks and obtains written customer approval for this project prior to proceeding to create a direct link to the regulatory driver.
	Efficiency		The project is assessed as partially efficient. The methodology used for the selection of the preferred option is not robust and as such appropriateness of the scope of the preferred option has not been demonstrated. Whilst we agree that designing infrastructure to cater for future demand is appropriate, we have not been provided with documentation supporting the potential growth in demand or setting out how the required size of the storage has been determined. As the costs have been based on a storage size larger than has been demonstrated to be required, the costs currently included in the budget are considered by us to be excessive and hence are not efficient. In our recommended costs we have allowed for a 10 ML storage to maintain a minimum of 24 hours supply in all parts of the delivery network.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

D.14.2 Recommendations

We conclude that the project expenditure is prudent and partially efficient, noting that this finding is based on the assessment criteria have not been completely met. As discussed above Jacobs considers that the efficient expenditure for this capital project is $2.90 million we recommend that it is reviewed again in the next Price Monitoring Investigation, especially if the expenditure value varies significantly to what has been approved at this time.

Appendix E. Low lift and high lift pump station switchboard and variable speed drives

E.1 Executive summary

Table E.1 presents an overview of the findings of the prudency and efficiency of the project. From our analysis we conclude that the project is both prudent and efficient.

Table E.1: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Low Lift and High Lift Pump Station Switchboard and Variable Speed Drives	Prudency		The project, as defined in single line diagram (SLD) 210-E-00151 revision B, is assessed as prudent as the primary driver of pump redundancy has been demonstrated through improved power supply distribution facilities. The requirement for the increase in capacity is in line with what is required to meet GAWB's understanding of Gladstone Council's likely increase in demand per annum for potable water.
	Efficiency		The project is assessed as efficient as the scope is appropriate for the assumed 20% demand growth. The standards of works are consistent with industry practice. However, the current cost estimates are based on the scope defined in SLD 210-E-00151 revision B, which includes VSDs for low lift pumps. SLD 210-E-00151 revision D shows the low lift pumps will be made redundant by larger high lift pumps. A revised cost estimate is required for the change in scope defined in SLD 210-E-00151 revision D. Hence we consider GAWB's costs to be efficient based on the costings for the project scope as defined in SLD 210-E-00151 revision B.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

E.2 Project description

The project involves works on the current switchboards and pump motor controls due to aging infrastructure and the consolidation of the low lift pump station and high lift pump station at the Gladstone WTP into one pump station. The exact scope of works for the project is yet to be finalised. Our understanding is that the latest cost estimate provided to Jacobs by GAWB and hence current GAWB cost estimate from Jacobs' perspective is based on the scope of works defined in SLD 210-E-00151 revision B. However, on the 6 January GAWB provided to Jacobs by mail a revised scope as defined in SLD 210-E-00151 revision D and the corresponding cost estimate for this revision is, at the time of writing, being compiled by GAWB. We have therefore undertaken a benchmark cost evaluation of this revised scope.

E.3 Proposed capex

Table E.2 shows the proposed cost of the Low Lift and High Lift Pump Station Switchboard and Variable Speed Drives within the 2015 to 2020 budgets.

Table E.2: Low Lift and High Lift Pump Station Switchboard and Variable Speed Drives proposed capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
Capital Expenditure Review *	5,087						**5,087**

* Capital Expenditure Review – QCA, Rev 6 (Cardno, 23 September 2014)

The estimated expenditure proposed by GAWB is $5,086,948. This is further described in “Email - Capex reconciliation - Cardno v QCA Oct 14”. Our understanding is that the current GAWB cost estimate is based on the scope defined in SLD 210-E-00151 revision B, but that the current scope is defined in SLD 210-E-00151 revision D. The corresponding cost estimate for this latest design is, at the time of writing, being compiled by GAWB and hence we have undertaken our assessment of efficient cost with respect to the revision B design.

E.4 Documentation reviewed

The key reference documents used for this review are:

- *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- Business Case Jan-14
- GWTP Pump Switchboards Upgrade Options 22-Dec-11
- GWTP High Lift/Low Lift Switchboard Upgrade Budget Estimate 7-May-14
- Project Plan for Asset Replacement Dec-12
- Email – GAWB to Jacobs January 2015
- Email – GAWB to Jacobs January 2015
- GAWB Committee Paper 2014-03-05.05 7-May-14
- Project Closure Report 15-Jan-14
- Email - Capex reconciliation - Cardno v QCA 21-Oct-14
- Email - Capex reconciliation - Cardno v QCA 15-Jan-14
- Email –GAWB to Jacobs – 7-Jan-2015 (forwarding SLD 210-E-00151 revisions B and D)

E.5 Key drivers

The primary driver identified for this project is end-of-life replacement, with risk mitigation a secondary driver. There are two pump stations at the Gladstone Water Treatment Plant which deliver water to the GAWB potable network and Gladstone Regional Council’s reticulation systems. The pumps are referred to as the ‘High Lift’ and ‘Low Lift’ pump stations. The current switchboards and pump motor controls are ageing and there are issues with peak power demand (as experienced in late 2013) exceeding the nominal rating of the power supply transformers.

We consider that there is a need for works given that the assets are reaching the end of their lives which is causing issues within GAWB’s systems. The project meets the QCA’s definition of prudency as it is required as a result of renewal of existing infrastructure.

From our site visit and inspection of name plate data as well as from discussions with GAWB, we understand that the low lift pump station was installed in circa 1972, and the high lift pump station was installed in circa 1992. As such we conclude that the switch gear for both pump stations is due for upgrade/replacement as neither will comply with current recommendations to prevent arc flash injury and spares for both are likely to become more increasingly problematic to source.

E.6 The scope of works

The initial scope of works is defined in Option 3B of the Welcon report dated 22 December 2011 and single line diagram (SLD) 210-E-00151 revision B dated 11 June 3013. The initial scope consists of a new combined switchboard for the high lift and low lift pumps and new individually mounted variable frequency drives for all pump motors, all located in the low lift pump building.

The current revised scope is defined in SLD 210-E-00151 revision D dated 6 January 3015 and consists of uprated high lift pump motors and VSDs and provision of a fitted spare VFD for a future fourth high lift pump which eliminate the need for the existing low lift pumps. The increased rating of the high lift pump motors and VSDs provides for an assumed 20% increase in load demand over the asset life. The requirement for the increase in capacity is in line with what is required to meet GAWB's understanding of Gladstone Council's likely increase in demand per annum for potable water..

This scope is the best means of reducing opex by operating the pumps at maximum efficiency over the system resistance head/flow range thus reducing electrical energy consumption. Also, the asset life is enhanced due to reduction of pressure surge/water hammer damage to pipeline and joints during start-up and shut down operations.

E.6.1 Solutions development

GAWB's submission indicates that an options analysis is currently being undertaken which considers the following options:

- Option 1 – Install variable frequency drives (VSDs) only (no switchboard upgrade)
- Option 2 – Direct replacement of High Lift/Low Lift switchboards
- Option 3A – Install combined High Lift/Low Lift switchboard
- Option 3B – New switch room

In 2011, Welcon recommended Option 3A. GAWB has proposed Option 3B (a new transportable switchroom as per SLD 210-E-00151 revision B dated 11 June 3013), Subsequently, GAWB has uprated the high lift pumps and VSDs to eliminate the low lift pumps and provide for an assumed 20% growth in load demand over the asset life. The scope of this update is defined in SLD 210-E-00151 revision D dated 6 January 3015. While we endorse this concept as the optimum solution, the sizing of the new high lift pump motors and VSDs requires pump curve and system model studies and perhaps a pilot installation for verification. However, since GAWB has only provided cost estimates for SLD 210-E-00151 revision B to us, we have undertaken our efficiency evaluation against this scope.

The "do nothing" option was not contained in the Welcon report.

We consider that the "do nothing" option results in:

- Increasing opex due to rising electricity cost at prevailing usage
- Increasing risk of plant unavailability due to ageing switchgear
- Decreasing spare parts availability due to obsolescent switchgear leading to non-maintainability and extended plant outages
- Increasing risk of pipeline and joint damage and life reduction due to pressure surge/water hammer during start-up and shutdown operation of pumps
- Increasing risk of harm to operators and maintenance workers due to arc flash hazard of ageing switchgear that is not internal arc fault containment certified and exceeds PPE protection capability

E.6.2 Consideration of variable frequency drives

The benefit of installing variable speed drives 'VSDs[6]' is primarily realised if it is necessary, in order to balance up flows on the network, to operate the pumps at varying flow rates. After giving consideration to the necessary operating regimes employed by GAWB we consider that it is prudent to fully evaluate the benefits of installing VSDs for the following reasons:

[6] Also known as variable speed drives (VSDs) as it is the varying frequency of the AC output voltage that results in a change in motor speed.

There is an energy efficiency benefit gained by minimising the hydraulic system resistance losses by optimising the pump speed. This benefit is best be demonstrated and quantified by a hydraulic study and graphical display of the flow vs head graph showing the hydraulic system resistance curve intersecting the various pump speed characteristics for power and efficiency. Whilst we have not undertaken such a study, from our discussions with operators and knowledge of how GAWB is required to operate its network we consider that an efficiency gain will be achieved by the installation of VSDs.

Also, fixed speed pumps can suffer from cavitation damage under unfavourable operating conditions (e.g. high NSPH), which can be avoided by VFD operation. Further, there may be electricity time of use tariffs and maximum demand constraints that can be better optimised by VSDs than direct on line (DOL) or soft start switching regimes for pumps and result in a lower cost/Ml pumped. In addition, VSDs will reduce starting current and hence maximum demand charges.

We note a reference to failures of pipe joint seals (rubber rings) in one pipeline, which may be susceptible to repetitive water hammer damage/fatigue. Coupled with failure risk on corroding ageing unclad steel pipes, an asset life reduction may be able to be costed and avoided via VFD application due to reduced water hammer when using VSDs, particularly during pump stopping. Together with an analysis of electricity savings arising from use of VSDs for the pumping regime required to maintain levels in storage reservoirs an analysis of pipeline asset life extension arising from use of VSDs to reduce water hammer fatigue mechanisms would quantify the, on face value, nice to have" subjectivity of the VFD option at present.

In light of additional information from GAWB as to the pumping regime (historic) we have undertaken additional work, in conjunction with KSB, a pump company that we work regularly with and that has verified some of our modelling. We have done this in so far as possible given that we do not have full information on flow rates, pump head and changes to such as reservoirs that are supplied (we are aware that the pumping regime chosen i.e. regular top up or longer pumping to take advantage of off-peak electricity will impact these variables). As always, closer definition requires more accurate and detailed information, which we don't have. However, taking into account that the pumps will supply different reservoirs having different heads and assuming that the pumps and pump operating set point are optimised for one of the reservoirs then it is inevitable that when pumping to the reservoir to which the pumps are not optimised for, inevitably, they will not be operating at their optimum point on the pump head, flow and power curves. Therefore, there is likely to be an advantage of incorporating VSDs into the design to enable the pumps to operate at their most efficient point when supplying the reservoirs – even in a 'top up' type pumping regime.

Given that the several reservoirs are at differing TWL and at various states of filling, water delivery will be to varying static heights, thus differing required pump heads with respect to delivery time. If, because of the different system resistance for each reservoir, a controlled flow rate is required, then the combination of head and flow will only rarely match a fixed speed pump curve. To overcome this limitation in performance, variable pump speed will be able to deliver the range of head versus flow required, with a consequent saving in power, as previously demonstrated. GAWB may wish to deliver to the reservoirs at off-peak conditions. Again this can be achieved at optimum conditions using variable speed pumps.

Therefore, given that the at least two different static heads are required for pumping to the two reservoirs, and assuming that the pumps are optimised for one of the reservoirs then, if the volumes of water pumped are equal for the reservoirs, on average, the pumps will be operating away from optimum, if operating at fixed speed approximately fifty percent of the time. Hence an overall saving of, say 15% plus or minus 25% may be reasonably expected if VSDs are employed. In addition, benefits would be obtained from avoiding in-rush current if using direct on line starting and from reduction in stress on the water supply infrastructure due to the 'soft start' and 'soft stop' characteristics of VFDs.

Given the above, we consider it prudent for GAWB to undertake a full option cost benefit and capex/opex trade off analysis to determine the merits or otherwise of installing VFDs during the reconfiguration and upgrade of the Low Lift and High Lift Pump Stations. From our analysis based on limited information, we consider it likely that such a cost benefit and capex/opex trade off analysis would come out in favour of adopting VSDs as good modern practice for pumping stations required to supply variable head and flow rates.

E.6.3 Project delivery

We have reviewed the proposed time frame for delivery of the project and find it to be reasonable. However, we consider that allowances should be made for modelling and pilot installation to verify the size of the recently proposed upgraded high lift pump scheme as per SLD 210-E-00151 revision D dated 6 January 3015.

E.7 Standards of service

We have not sighted the standards or regulations that the upgrade will be designed to. However, from our review of other capital works carried out by GAWB we anticipate that all relevant standards, regulations and industry good practice will be adhered to.

E.8 Project cost

The project scope and hence project costs have gone through a number of iterations as definition and scoping of the project has progressed. A summary of the initial project costs seen by Jacobs from the 2013 Welcon estimate are shown below.

Table E.3: Summary of Welcon 2013 Estimate

	Materials	Labour	Total
Mobilisation / Site Establishment	9,900	68,200	78,100
New 415V Switch Room	1,256,081	95,700	1,351,781
High Lift Pump House Installation	203,610	115,060	318,670
Low Lift Pump House Installation	113,440	54,560	168,000
Testing & Commissioning	5,350	96,800	102,150
Engineering Design & Documentation			134,000
GAWB Project Management & Administration			407,480
Ergon Energy Costs			300,000
Sub Total			**2,860,181**
GAWB Contracting Strategy Allowance		10%	286,018
Contingency Allowance		20%	572,036
Total			**3,718,300**

GAWB later updated these costs to total some $4.86 million. These later costs are reconciled with the budget costs as provided by GAWB to Jacobs as shown below.

Table E.4: Reconciliation of Welcon 2013 Estimate to Budget

	Materials	Labour	Total	Revised values from GAWB
Mobilisation / Site Establishment	9,900	68,200	78,100	122,100
New 415V Switch Room	1,256,081	95,700	1,351,781	1,351,781
High Lift Pump House Installation	203,610	115,060	318,670	318,670
Low Lift Pump House Installation	113,440	54,560	168,000	168,000
Testing & Commissioning	5,350	96,800	102,150	102,150
Engineering Design & Documentation			134,000	134,000
GAWB Project Management & Administration			407,480	407,480

	Materials	Labour	Total	Revised values from GAWB
Ergon Energy Costs			300,000	540,000
Demolition cost for low lift PS				100,000
Replacement of high lift motors				64,000
Auxiliary supplies				34,000
Detailed design cost (capital)				180,000
Base Costs Sub-total			**2,860,181**	**3,522,181**
GAWB Contracting Strategy Allowance	10%		286,018	352,218
Contingency Allowance	20%/28%[2]		572,036	986,211
Total			**3,718,235**	**4,860,610**[1]

[1] Note total has been rounded from $4,852,399
[2] Note contingency percentage has been increased from 20% to 28% in the revised values

Subsequent to this GAWB has submitted a cost estimate to Jacobs which includes an additional non-specified item ($226,390), which may possibly represent the allocation of corporate overheads to the sub-total, taking total project costs to $5.087 million as set out below.

Table E.5: Final GAWB cost estimates provided to Jacobs

	Revised values from GAWB
Mobilisation / Site Establishment	122,100
New 415V Switch Room	1,351,781
High Lift Pump House Installation	318,670
Low Lift Pump House Installation	168,000
Testing & Commissioning	102,150
Engineering Design & Documentation	134,000
GAWB Project Management & Administration	407,480
Ergon Energy Costs	540,000
Demolition cost for low lift PS	100,000
Replacement of high lift motors	64,000
Auxiliary supplies	34,000
Detailed design cost (capital)	180,000
Base Costs Sub-total	**3,522,181**
GAWB Contracting Strategy Allowance (10%)	352,218
Contingency Allowance (28%)	986,211
None specified item (Allocation of corporate overhead?)	226,390
Total	**5,087,000**

As we have obtained indicative quotes for major capital items, our cost estimate is equivalent to a Class 3 estimate (+30%/-20%), i.e. more precise than an Order of Magnitude estimate. As such, in our assessment of efficiency, we take +30% as the upper limit of efficient costs over our cost estimates.

No information has been provided to account for the variation in the “budget” value of $4.86 million contained in documentation seen by Jacobs to the budget $5.1 million submitted to the QCA. However, this higher budget figure may include GAWB’s allocation of certain internal costs which we have not sighted. We note that both the

$4.86 and $5.1 million are within 30% of our Class 3 cost estimate of $4.29 million as set out below. We compare our Class 3 cost estimate for capital expenditure with those of GAWB in Table E.6 below.

Table E.6: Comparison cost estimate

Item	Revised values from GAWB	Jacobs' estimated costs	Comparison	Comments
Mobilisation / Site Establishment	122,100	120,000	2%	
New 415V Switch Room	1,351,781	1,250,000	8%	
High Lift Pump House Installation	318,670	250,000	27%	
Low Lift Pump House Installation	168,000	131,798	27%	
Testing & Commissioning	102,150	100,000	2%	
Engineering Design & Documentation	134,000	152,610	-12%	Calculated at 3% of base cost total
GAWB Project Management & Administration	407,480	356,090	14%	Calculated at 7% of base cost total
Ergon Energy Costs	540,000	540,000	0%	
Demolition cost for low lift PS	100,000	100,000	0%	
Replacement of high lift motors	64,000	84,000	-24%	
Auxiliary supplies	34,000	34,000	0%	
Detailed design cost (capital)	180,000	180,000	0%	
Base Cost Sub-total	**3,522,181**	**3,298,498**	7%	
GAWB Contracting Strategy Allowance	352,218	329,850	7%	Jacobs calculated at 10% of base cost sub-total
Contingency Allowance	986,211	923,580	7%	Jacobs calculated at 20% of base cost sub- total
None specified item (Overhead?)	226,390	0	-100%	Jacobs calculated at 0% of base cost sub- total
Total	**5,087,000**	**4,763,940**	7%	

GAWB's costs are within 30% of our Class 3 cost estimate and, as such, we consider GAWB's costs of $5.09 million for completing the scope of works defined in SLD 210-E-00151 revision B to be efficient.

E.9 Capex trade-offs with opex (substitution possibilities)

As set out in section E.11 below, we expect the consolidation of the low and high lift pump stations and the installation of new switch gear to reduce future operating expenditure.

E.10 Efficiency gains

Option 3B of the Welcon report and the later SLD 210-E-00151 revision D dated 6 January 3015 provides efficiency gains by the introduction of variable frequency drives to the uprated high lift pump motors thereby reducing electrical energy demand (operating cost) and potential water hammer damage to pipelines and joints during start-up and shut down operations (repair cost and extension of asset life).

E.11 Implications for operating expenditure

We expect a reduction in operating costs in the form of:

- Reduced electrical energy consumption to result from the introduction of variable frequency drives to all pump motors enabling pump efficiency to be optimised through speed control and pipeline losses to be reduced
- Less severe water pressure surge (water hammer) potential damage to pipelines and joints during start-up and shutdown of pumps
- Reduction in maximum demand and peak period electricity costs by accurately modulating pump flows using demand side management
- Introduced supply redundancy (N-1), allowing early preventative maintenance without impact on availability

E.12 Policies and procedures

From our review of the documentation we consider that GAWB has followed its policies and procedures for the implementation of this project.

E.13 Assessment of reported expenditure

Table E.7 below tabulates our benchmark capex and GAWB's capex together with our assessment of efficient costs for the Low Lift and High Lift Pump Station Switchboard and Variable Frequency Drives. As GAWB's project estimate is within +30% of our Class 3 Pre-Feasibility Study cost estimate, we conclude, based on our assessment method that the efficient costs for the project are $5.09 million.

Table E.7: Low Lift and High Lift Pump Station Switchboard and Variable Speed Drives revised capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
Original value	5,087						**5,087**
Jacobs benchmark cost estimate	4,288						**4,288**
Jacobs assessment of efficient costs	5,087						**5,087**
Variation to GAWB's costs	0						**0**

E.14 Extrapolation to other projects

We consider that the introduction of variable frequency drives to other pump stations will provide similar benefits to those set out above.

E.15 Summary/conclusions and recommendations

E.15.1 Summary

Table E.8 presents an overview of the findings of the prudency and efficiency of the project.

Table E.8: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Low Lift and High Lift Pump Station Switchboard and Variable Speed Drives	Prudency		The project, as defined in single line diagram (SLD) 210-E-00151 revision B, is assessed as prudent as the primary driver of pump redundancy has been demonstrated through improved power supply distribution facilities. The requirement for the increase in capacity is in line with what is required to meet GAWB's understanding of Gladstone Council's likely increase in demand per annum for potable water.

	Efficiency		The project is assessed as efficient as the scope is appropriate for the assumed 20% demand growth. The standards of works are consistent with industry practice. However, the current cost estimates are based on the scope defined in SLD 210-E-00151 revision B, which includes VFDs for low lift pumps. SLD 210-E-00151 revision D shows the low lift pumps will be made redundant by larger high lift pumps. A revised cost estimate is required for the change in scope defined in SLD 210-E-00151 revision D. Hence we consider GAWB's costs to be efficient based on the costings for the project scope as defined in SLD 210-E-00151 revision B.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

E.15.2 Recommendations

We consider that the efficient costs for the project are $5.09 million.

Appendix F. East End Reservoir - various works

F.1 Executive summary

The project involves various works at the East End Reservoir to rectify reservoir condition issues, including external concrete rectification, external strengthening and roof repairs and replacement. The works were identified through a survey of the reservoir. The project has not been reviewed by the QCA.

From our analysis we conclude that the project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table F.1.

Table F.1: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
East End Reservoir - Various Works	Prudency		The project is assessed as prudent as the primary driver of renewal has been demonstrated through evidence of the deterioration of the existing infrastructure.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are anticipated to be consistent with industry practice given the standard or works implemented by GAWB that we have previously reviewed. An independent cost estimate has been developed for the works which is considered appropriate for the current phase of the project. We have reviewed the costs for undertaking the works and found them to be within the range our order of magnitude (+40%/-20%) benchmark cost estimates. We consider that the sole sourcing of reservoirs condition/risk assessment services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not market tested. However, we have not recommended a reduction in costs on this basis.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

F.2 Project description

The project involves various works at the East End Reservoir to rectify reservoir condition issues, including external strengthening, external concrete rectification, and roof repairs and replacement, identified through a condition assessment of the reservoir. Jacobs notes that this project has not been reviewed by the QCA.

We understand that the QCA proposed some optimisation of the network during the 2005 review. We understand that the original intent for the reservoir was for 5 ML of raw water storage. The reservoir was repurposed to provide treated water to Gladstone Regional Council. We understand that the required treated water storage was only 1 ML; however, it was determined that the reuse of the existing reservoir than to construct a new reservoir of the required volume. Our assessment has considered the whole asset and has not taken into consideration any optimisation of the asset.

F.3 Proposed capex

Table F.2 shows the proposed cost of the East End Reservoir - Various Works within the 2015 to 2020 budgets.

Table F.2: East End Reservoir proposed capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Sample confirmation email (dated 15/10/2014)			1,177			**1,177**
Capital Expenditure Review *		1,177				**1,177**

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Various Reservoir Repairs – Schematic Design Estimate†		1,098				**1,098**

* Capital Expenditure Review – QCA, Rev 6 (Cardno, 23 September 2014)

† *Various Reservoir Repairs – Schematic Design Estimate* (Donald Cant Watts Corke, 30 January 2014)

We note that there is a difference of approximately $79,000 between the total project cost estimated included in the *Capital Expenditure Review – QCA* (Cardno, 23 September 2014) and the cost estimate in the *Various Reservoir Repairs – Schematic Design Estimate* (Donald Cant Watts Corke, 30 January 2014). No details have been provided to explain this difference. However, we have assumed that this difference is the cost of GAWB's internal costs.

F.4 Documentation reviewed

The key reference documents used for this review are:

- *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- *Project Closure Report – Fitzsimmons St 16ML – Reservoir Remediation* (GAWB, 11 August 2014)
- *Email re: GAWB Reservoir Investigation planning* (GAWB, 1 May 2014)
- *Various Reservoir Repairs – Schematic Design Estimate* (Donald Cant Watts Corke, 30 January 2014)
- *GAWB Reservoirs – Scoping Document for Cost Estimate Purposes* (Vinsi Partners, 20 December 2013)
- *GAWB Reservoirs – Condition/Risk Assessment* (Vinsi Partners, 10 December 2013)
- *Project Closure Report – Fitzsimmons St 50ML – Buttress Grouting and Repairs* (GAWB, 30 August 2013)
- *Project Closure Report – Fitzsimmons St 50ML – Reservoir Roof Replacement* (GAWB, 31 May 2012)
- *Project Closure Report – Fitzsimmons St 50ML – Desludging and Repairs* (GAWB, June 2010)

F.5 Key drivers

The primary driver identified for this project is renewal. Structural surveys of the reservoir have been undertaken periodically to monitor the condition of the reservoir. The most recent survey, undertaken in 2013, identified that the degree of cracking and lime leaching to the external wall surfaces of the reservoir had increased since the previous survey, undertaken in 2007.

Of the drivers used by GAWB (risk mitigation, end of life replacement, regulatory obligation, capacity, and business improvement), Jacobs considers that end of life replacement (which we read as including refurbishment) is the primary driver as the works reduce the address the deterioration in condition of the asset. We consider that this driver most closely maps to the regulatory driver of *"renewal".* As such, the project meets the QCA's definition of prudency as it is required with respect to renewal of existing infrastructure.

F.6 The scope of works

F.6.1 Solutions development

The scope of works for the project includes:

- Externally concrete rectification
- External strengthening
- Roof repairs and replacement

- Tests/appraisals and inspections

From our review of the *Condition/Risk Assessment* (Vinsi Partners, 10 December 2013) and the scope of repair works proposed (Vinsi Partners, 20 December 2013), the external concrete rectification and strengthening works proposed are considered appropriate. We note that significant localised corrosion to post-tensioned strands was observed during the inspection which could lead to localised failure with resultant loss of reservoir structural integrity.

In addition, we consider the replacing the roof, due to presence of asbestos cement (AC) roof sheeting, is also appropriate. We note that other water service providers have taken a similar approach to remove AC roofs from their reservoir sites.

It is noted that the *Scoping Document* (Vinsi Partners, 20 December 2013) does not specifically discuss alternative options for completing the works; however, there are a limited number of alternatives that were likely able to be considered, i.e. refurbishment, like for replacement or replacement with a modern equivalent.

At the meeting with GAWB on the 29th October 2014 (Capex Conclave, 2014), GAWB stated that refurbishing the reservoir remained cheaper than replacing it. We concur that the costs of replacing a 5 ML reservoir would exceed the refurbishment costs. However, based on the limited information available, we find that the costs for the construction of a new 1 ML reservoir (approximately $1 million), would be comparable to the refurbishment costs (excluding land purchase and earthworks). The feasibility (and associated cost) of constructing a new reservoir would be dependent on site constraints, such as land availability and site topography. Further investigations into a new reservoir are outside the scope of this report.

We note that additional inspections were scheduled to be undertaken in May 2014. We have not sighted to outcomes of this investigation. We anticipated the outcomes from this investigation will further clarify the scope of works to be undertaken. We recommend that following this investigation to further clarify scope, consideration is given to alternative options, such as the construction of a new reservoir. This options analysis should also consider any potential growth, which would dictate the preferred size of storage.

Based on the information available at the time of writing, we consider that the scope of works for the project to be appropriate and hence prudent to rectify the issues identified.

F.6.2 Project delivery

No details on the proposed delivery has been sighted, i.e. no project plan or business case. Given that the works are schedules to be undertaken in 2016/17 we would expect a project plan and a business case to have been developed by this stage.

We note that GAWB has recently completed a number of similar reservoir remediation projects on other reservoirs in the system including remediation of the 16 ML Fitzsimmons St Reservoir, and buttress grouting and repairs, roof replacement and desludging and repairs of the 50 ML Fitzsimmons St Reservoir. From the information provided we understand that contracts for the works (four in total) have been awarded to three different contractors. However, there is no indication of how there were awarded, i.e. sole source, three quotations, open tender, etc.

Given the proposed value of the project of approximately $1.8 million, if the whole scope of works is awarded in one contract we would expect an open tender or that an EOI process to be adopted.

From discussion with GAWB, we understand that Vinsi Partners was engaged to undertake reservoir condition/risk assessment services for a program of reservoirs through a sole sourcing process. No details of the total contract cost have been provided to us. We expect the value of the works to be in excess of $10,000, but less than $250,000. This requires three quotations according the GAWB's processes.

In response to the draft report, GAWB provided the following information to support the sole source use of Vinsi:

- *"GAWB considers that the condition assessment of its water supply reservoirs to be a specialised service, due to a combination of:*
  - *Age of certain GAWB reservoirs*
  - *Variety of reservoir designs and general uncertainty about the quality of construction and reliability of design and "as constructed" information (where available).*
  - *Number of likely degradation and or potential failure patterns which whilst not individually specific to concrete reservoirs or water retaining structures, altogether provide a technically challenging issue*
- *GAWB has had serious structural issues with its post tensioned reinforced concrete reservoir structures,*
- *Vinsi has a history of working on aged post tensioned concrete reservoirs that other engineering firms do not have. GAWB's reservoirs are critical to its water delivery operation and so confidence in the contractor's ability to affect the repair is important.*
- *GAWB approach another engineering firm and considered the contractor's approach not appropriate to the task.*
- *GAWB has maintained a relationship with Vinsi for over seven years, the benefits being; continuity of Vinsi personnel and successful rehabilitation of structures based on Vinsi's advice.*

If the task was for the construction of a new reservoir GAWB would look towards an open tender process as there are several engineering firms capable of undertaking the task. In GAWB's view, the experience Vinsi has in the repair of aged reservoirs distinguished Vinsi from the other engineering firms".

We note that the condition assessment of water retaining structures is a specialist area. We also recognise that Vinsi is a recognised and respected service provider in this area. In addition, we note that proven experience is a highly relevant factor in the selection of a contractor. However, we note that these structures, including post tensioned reinforced concrete reservoir structures are not unique to GAWB and that there are other service providers in this field. Without evidence of market testing, it is difficult for GAWB to demonstrate that this sole sourcing arrangement has provided value for money for its customers.

GAWB has further stated that "*typically when GAWB has engaged Vinsi for other tasks (e.g. South Tree Inlet Bridge Condition Assessment) it has been on a tendered or similar non-sole source selection process*". Whilst we understand this to be the case, we have not seen documented evidence of this (refer to C.6.2).

Whilst we do not specifically recommend accost reduction for this sole sourcing, the use of sole sourcing is apparent across several of GAWB's projects and is discussed further in the body of the report.

F.7 Standards of service

All design, materials and workmanship should be in accordance with the relevant and current SAI codes and within the by-laws and ordinances of the relevant building authorities, including but not limited to the following Australian standards:

- AS3600 – Concrete structures
- AS3735 – Concrete structures for retaining liquid
- AS1170 (all parts) – Structural design actions
- AS4100 – Steel structures
- AS1657 – Fixed platforms, walkways, stairways and ladders – Design, construction and installation

Whilst we have not reviewed the standards for the work specified by GAWB, from our review of other works completed by GAWB we fully expect that the above standards will be adhered to.

F.8 Project cost

The following cost breakdown was provided for the project.

Table F.3: Cost breakdown ($) (Donald Cant Watts Corke, 30 January 2014)

Element	Value ($)
Concrete Rectification (Externally)	173,000
External Strengthening	115,000
Roof Repairs and Replacement	301,000
Tests/appraisals and Inspections	26,000
SUB-TOTAL (Trade Cost) (excluding GST)	**615,000**
Preliminaries (18.00%)	111,000
Margin (5.00%)	37,000
Design Contingency (15.00%)	115,000
SUB-TOTAL (Contract Sum) (excluding GST)	**878,000**
Construction Contingency (10.00%)	88,000
Design & Professional Fees (10.00%)	97,000
Insurance, Statutory Fees (3.25%)	35,000
PROJECT COST - NON CONTRACT WORKS	**220,000**
GROSS PROJECT COST (excluding GST)	**1,098,000**

The capital works cost estimate for the works was prepared by a consultant for GAWB. It is understood that GAWB does not have a standardised cost estimation procedure, but that they tend to use consultants for this activity. Given that a consultant experienced in this field will often have several similar or related projects from which to develop cost estimates, we consider GAWB's approach of using consultants for cost estimates, given GAWB's size, to be appropriate.

The basis for the unit rates used in developing the estimate were identified as primarily the previously completed similar projects, at Fitzsimmons St 50 ML and 16 ML reservoirs and Mt Miller reservoir, and a quotation for specialist work, i.e. the external wall strengthening.

From our review of the costs, the direct costs appear to be reasonable and in line with our benchmark cost estimates. The contingency allowances applied are also considered to be reasonable for the current phase of the project. For a project in the preliminary phase we consider the use of an independent cost estimate to be appropriate and efficient. As mentioned previously, additional investigation was scheduled to be undertaken in May 2014, which was expected to provide further clarity of the scope of works required. This will provide more certainty for the cost estimate and hence we would expect to see a lower contingency allowance.

As noted above, the costs of the repair works are in line with high level estimates of a new reservoir (excluding land purchase and earthworks). We recommend that the replacement options are considered prior to implementing the proposed refurbishment works.

As the value of the works is in excess of $500,000, we understand that, under GAWB's procurement processes, an open tender or expression of interest (or similar) process will be undertaken for the procurement of the works. As such time and assuming sufficient competitive bids are received to demonstrate competition, the value of the works will be market tested.

As discussed in Section F.3, the capital expenditure outlined in the *Various Reservoir Repairs – Schematic Design Estimate* (approximately $1.098 million) does not align with the value submitted by GAWB (approximately $1.177 million). Based on the detailed cost breakdown provided, we assume that the difference

in costs is GAWB's internal costs. As such, we consider that the proposed expenditure of $1.1772 million is efficient.

F.9 Capex trade-offs with opex (substitution possibilities)

No evidence of GAWB's review of capex trade-offs with opex solutions options have been presented to us. However, given the nature of the project, we consider that there is limited ability of non-infrastructure options that have the ability to meet the key project driver of renewal of the reservoir.

F.10 Efficiency gains

We note that a number of reservoirs were identified as requiring works to maintain them. Economies of scale, and hence savings, may be able to be achieved by tendering the works on all reservoirs as a package. The actual efficiency savings will be dependent on the location of the reservoirs and the type of works to be undertaken at each site.

F.11 Implications for operating expenditure

We consider that there will be limited implications for operating expenditure as a result of this project as the majority of the works are refurbishments.

F.12 Policies and procedures

We understand that, due to the early stage of the project, only a budget estimate has been developed for this project, which is in keeping with the level of documentation that we would expect to be available at this stage of the project. We anticipate that as the project progresses additional documentation including: Project Justification Form; Project Plan; Business Case; planning documents and reports; contract documents and reports; and a Project Closure Report, will be developed.

We are unable to conclude that GAWB's purchasing policy was followed with respect to the sole supplier invitation for the provision of reservoirs condition/risk assessment services by Vinsi Partners. However, the value of these contracts is unknown and as such the methodology adopted may be appropriate. As discussed previously, we would expect the value of the works to be excess of $10,000, but less than $250,000, which should have required three quotations according the GAWB's processes.

F.13 Assessment of reported expenditure

Table F.4 below identifies the revised capex for East End Reservoir - various works.

Table F.4: East End Reservoir - various works revised capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Original value		1,177				**1,177**
Jacobs proposed value		1,177				**1,177**
Variation (to original value)		0				**0**

F.14 Extrapolation to other projects

As noted above, the reservoirs condition/risk assessment services for this project were sole sourced to Vinsi Partners. We consider that sole sourcing this work may not have resulted in efficient costs. This is discussed further in the main body of the report.

F.15 Summary/conclusions and recommendations

F.15.1 Summary

Table F.5 presents an overview of the findings of the prudency and efficiency of the project.

Table F.5: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
East End Reservoir - Various Works	Prudency		The project is assessed as prudent as the primary driver of renewal has been demonstrated through evidence of the deterioration of the existing infrastructure.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are anticipated to be consistent with industry practice given the standard or works implemented by GAWB that we have previously reviewed. An independent cost estimate has been developed for the works which is considered appropriate for the current phase of the project. We have reviewed the costs for undertaking the works and found them to be within the range our order of magnitude (+40%/-20%) benchmark cost estimates. We consider that the sole sourcing of reservoirs condition/risk assessment services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not market tested. However, we have not recommended a reduction in costs on this basis as it is difficult to quantify the likely increase in costs over efficient without being subjective.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

F.15.2 Recommendations

We conclude that the project expenditure is prudent and efficient. As discussed above Jacobs considers that the efficient cost for this project is $1.18 million.

Appendix G. Dam safety compliance works

G.1 Executive summary

The project concerned involved the undertaking of various works on the Awoonga Dam primarily associated with safety of the dam wall and spillway structure to ensure compliance with regulatory requirements for dam safety. The project was not reviewed by the QCA in its 2010 price setting review. However, we note that the costs as presented to us for this project are higher than forecast in the 2010 QCA submission, primarily due to additional scope items.

From our analysis we conclude that the project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table G.1.

Table G.1: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Dam Safety Compliance Works	Prudency		The project is assessed as prudent as the primary driver of Compliance with legal obligation has been demonstrated through the requirement to meet the Dam Safety Management Guidelines for a referable dam under the Water Supply (Safety & Reliability) Act.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are considered to be consistent with industry practice. The majority of the costs associated with the principal contracts are consistent with prevailing market conditions. Variations have been well documented and approved following appropriate processes. However, we consider that the sole sourcing of project management and technical services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not market tested.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

G.2 Project description

The project involved the undertaking of a program of various works on the Awoonga Dam primarily associated with safety of the dam wall and spillway structure to ensure compliance with regulatory requirements for dam safety. The original scope of works involved:

- Refurbishment and other modifications to the crane system at the inlet tower
- Inspections of and maintenance on valves at the inlet tower
- Gallery modifications and drain remediation at the spillway
- River discharge and chlorine pit valve inspections and maintenance, chlorine pit repairs, installation of remote operations
- Repairs to concrete lining in the Awoonga-Callide Connection

Subsequently, additional scope was added to the project, including replacement or refurbishment of mechanical items. The project has recently been completed.

We note that although this project was not reviewed by the QCA in the 2010 *Investigation of Pricing Practices* (QCA, June 2010); this project was included in the GAWB submission. The current projected expenditure is higher than forecast in the 2010 QCA submission, including the original QCA forecast figure.

The table below presents a summary of the actual project costs (provided June 2014) and the resultant excess over the QCA forecast.

Table G.2: Project cost summary ($'000) (Cardno, 23 September 2014)

Project	QCA forecast	Actual project cost (Jun 2014)	Excess over QCA forecast
Dam Safety Compliance Works	526	4,444	3,918

G.3 Proposed capex

Table G.3 shows the proposed cost of the Dam Safety Compliance Works within the 2009 to 2015 budgets.

Table G.3: Dam Safety Compliance Works capex ($'000)

Source	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Total
Sample confirmation email (dated 15/10/2014)						4,444	**4,444**
Capital Expenditure Review *						4,444	**4,444**

* *Capital Expenditure Review – QCA*, Rev 6 (Cardno, 23 September 2014)**Documentation reviewed**

The key reference documents used for this review are:

- *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- *Water Supply (Safety and Reliability) Act 2008*
- *Scope of Work for Awoonga Dam Design Modifications* (GAWB, 28 November 2008)
- *Report for Awoonga Dam Design Modifications - Implementation and Strategy Report* (GHD, July 2009)
- *Business Case for Dam Safety Compliance Works* (GAWB, 22 September 2009)
- *Dam Safety Compliance Program of Works* (GAWB, 9 August 2010)
- *Board paper - Variation to the Dam Safety Compliance Program of Works* (GAWB, 26 May 2011)
- *Resolutions from 26 May 2011 Board meeting* (GAWB, 31 May 2011)
- Numerous variations:
  - RCR Eagle Variations 1 to 16
  - Temmco Variations 1 to 15
  - Kone Cranes Variation 1 to 3
  - Mondelphous Variation 1
  - Hydrojet Systems Variation request response
  - Pacific Marine Group Variation request responses
- *Formal Instrument of Agreement between RCR Resources (Eagle) Pty Ltd and Gladstone Area Water Board* (2 July 2010)
- *Formal Instrument of Agreement between Temmco and Gladstone Area Water Board* (12 July 2010)
- *Formal Instrument of Agreement between Kone Cranes and Gladstone Area Water Board* (7 October 2010)
- *Service Provider Agreement between Gladstone Area Water Board and Monadelphous Engineering Pty Ltd* (GAWB, 2 February 2012)

- *Service Provider Agreement - Supply of New Screens, Grapple and Baulk Modifications at Awoonga Dam* (GAWB, 3 February 2012)
- *Awoonga Dam Spillway Drain Cleaning – Contract OP 2010-009* (GAWB, April 2010)
- *Formal Instrument of Agreement – OP2010-009 Modification of Stop Bracket (Inlet 6)* (GAWB, 22 May 2013)
- *Standing Offer Agreement with Aestec Pty Ltd commencing* (9 December 2010)
- *Formal Instrument of Agreement – OP2010-009 Internal Inspection, Clean & Paint 7 Inlet Pipes* (GAWB, 21 March 2013)
- *AS49051-2002 Minor Works Contract* (GAWB, 23 December 2009)
- *Formal Instrument of Agreement between Aestec Pty Ltd and Gladstone Area Water Board* (1 December 2009)
- *Formal Instrument of Agreement – OP2010-009 Internal Inspection, Clean & Paint 7 Inlet Pipes* (GAWB, undated)
- *Revised Proposal for Awoonga Dam: Valve Refurbishment Project - Technical Assistance and Superintendence* (GHD, undated)
- *Proposal for Awoonga Dam Intake Tower Crane Upgrade Engineering Services* (GHD, 28 October 2010)
- *Awoonga Dam Valve Refurbishment - Tender Evaluation* (GHD, April 2010)
- *Contract OP 2010-009: Awoonga Dam Outlet Tower Crane Upgrade - Tender Evaluation* (GHD, July 2010)
- *Report for Awoonga Dam Spillway Drain Cleaning - Tender Evaluation Report* (GHD, February 2010)
- *Notice of Intention to Contract – Kone Cranes* (GAWB, 13 September 2010)
- *Meeting Minutes - Between GAWB & Hydrojet, To discuss rates for additional works i.e. setting up and drilling training wall holes, camera work, crane hire* (GAWB, 22 June 2010)

G.5 Key drivers

The primary driver identified for this project is regulatory obligation which maps directly to the QCA's regulatory driver of '*required as a result of legal obligation'*, with increasing reliability as a secondary driver. GAWB's submission states: *"The objectives of the project when initially identified were primarily concerned with safety of the dam wall and spillway structure to ensure compliance with regulatory requirements for dam safety, as well as ensuring reliability of water supply to customers."* The *Capital Expenditure Review – QCA, Rev 6* (Cardno, 23 September 2014) states that the project was initiated to meet the regulatory requirements as a referable dam under the *Water Supply (Safety & Reliability) Act*.

The *Business Case* (GAWB, 22 September 2009) states the 2007, 2008 and 2009 Annual Dam Safety Inspections included a number of recommendations to address deficiencies and to maintain the Dam in compliance with the Dam Safety Management Guidelines. This project was initiated to actions these recommendations.

The driver of regulatory obligation is considered to be appropriate as the dam does not meet the requirements for a referable dam under the *Water Supply (Safety & Reliability) Act*. The project meets the QCA's definition of prudency as it is required as a result of a legal obligation.

G.6 The scope of works

G.6.1 Solutions development

The scope of works described in the *Business Case* (GAWB, 22 September 2009) included:

- Inlet tower works:

  - Refurbishment of centre crane
  - Overhaul of 6 x DN1500 inlet valves
  - Replacement of coarse screens
  - Installation of guard rails around tower floor penetrations/slots
  - Installation of penstock air vent support
  - Removal of DN300 UPVC air pipe
  - Corrosion repair of riser pipe
- Spillway works:
  - Relocation of cable tray
  - Relocation of stair on spillway gallery
  - Remediation of drain holes in spillway apron, abutments and gallery
- River discharge and chlorine pit works:
  - Refurbishment of DN2000 and DN900 butterfly valves in the river discharge
  - Refurbishment of DN1900 fixed cone dispersion valve in the river discharge
  - Refurbishment of DN300 needle/cone valve in the river discharge
  - Removal of pipework in the chlorine pit
  - Repairs to the platform in the chlorine pit
  - Overhaul of the DN1400 butterfly valve in the chlorine pit
- Repairs to the concrete lining in the Awoonga-Callide Connection

It is noted that the *Business Case* does not specifically discuss alternative options for completing the works. However, as the works were identified to rectify deficiencies with the Dam, in accordance with the Dam Safety Management Guidelines, there are a limited number of alternatives that are able to achieve the required outcomes, i.e. only refurbishment, like for replacement or replacement with a modern equivalent. It is noted that for the valves, the *Implementation and Strategy Report* (GHD, July 2009) compares the costs for refurbishment and replacement.

The *Dam Safety Compliance Program of Works* (GAWB, 9 August 2010) includes a number of additional activities to be undertaken as part of the program. This work included two completely new activities which had already been completed, being:

- Upgrade and overhaul of the intake tower lift
- Installation of a piezometer on the spillway

In addition, the *Dam Safety Compliance Program of Works* (GAWB, 9 August 2010) identified a number of other activities which expanded upon the original scope, such as the replacement of the old intake tower crane, additional modifications to the crane system, and installation of an electric sump pump in the river discharge pit.

The *Board Paper - Variation to the Dam Safety Compliance Program of Works* (GAWB, 26 May 2011) states:

> *"Further investigations and preparatory works undertaken have identified that additional scope items were required to complete the project. The limited knowledge and condition assessments of existing infrastructure and additional risk mitigation measures required to deal with the limitation of the 12 hour shut down associated with GAWB's requirements for pump to maintain supply have resulted in significant additional work and costs required to complete the program of works"*

The additional works identified in the paper are:

- Purchase of a replacement DN1400 butterfly valve as it was damaged beyond repair
- Construct and demolish coffer dam which was required to allow the river discharge pit valve removal and refurbishment program to be maintained while the dam was still spilling

We consider that this additional scope incorporated into the program of works is acceptable considering that more information became available as to scope requirements to GAWB as the project progressed. However, we consider that, where possible, a more structured approach to identifying the full scope of works at the start of a program is preferable. Although no specific options analysis appears to have been undertaken for the program, the available options are limited, and the decisions made in relation to scope of works are based on industry experience and therefore acceptable.

G.6.2 Project delivery

According to the *Program of Works* (GAWB, 9 August 2010), the program was delivery through seven separate projects as outlined below in Table G.4.

Table G.4: Project schedule (GAWB, 9 August 2010)

Program No.	Description	Anticipated Completion
1	Valves overhaul	July 2011
2	Intake tower crane upgrade	June 2011
3	Spillway repairs and remediation	December 2010
4	Conduit repairs	June 2011
5	Intake tower lift upgrade and overhaul	July 2011
6	Spillway piezometer	June 2010
7	Conduit – inspection and condition assessment	December 2010

We consider that delivering the program through a number of projects is appropriate given the various skill sets required to undertake the different tasks. The *Program of Works* proposed to engage GHD to provide project management and technical services for the project under an existing Standing Offer Arrangement. We consider that sole sourcing this work may not have resulted in efficient costs as, by definition, the offer submitted by GHD was not market tested. Further discussion on GAWB's use of sole sourcing is discussed in the body of this report.

It is understood that the project was recently completed, significantly behind the original completion schedule of August 2011. In discussions, GAWB indicated that the delays were due to this being a high risk project, with more planning was required than originally anticipated.

G.7 Standards of service

No details have been provided to us regarding the standard that the works will conform to. However, for the majority of works, the scope involved refurbishment of existing assets, such as the valves and the crane; as such the standard for these assets is pre-determined.

It is understood that a consultant for GAWB developed specifications for the majority of works to be undertaken and is therefore likely to adopt good industry practice and with comply with relevant legislation and guidelines.

Whilst we have seen no documentary evidence to enable us to state categorically that the works are compliant, from other evidence we have seen on capital construction projects, we draw the conclusion that GAWB adopts good practice and hence we expect that necessary legislation and guidelines for dam construction will be adhered to.

G.8 Project cost

The *Program of Works* included the following breakdown of project costs.

Table G.5: Breakdown of project costs (GAWB, 9 August 2010)

Program No.	Description	Original Budget	Revised Opex	Revised Capex	Revised Total
1	Valves overhaul	1,654,000	346,676	2,271,005	**2,617,681**
2	Intake tower crane upgrade	524,919	28,439	808,725	**837,164**
3	Spillway repairs and remediation	515,000	578,320	421,000	**999,320**
4	Conduit repairs	70,000	101,960	666,133	**768,093**
5	Intake tower lift upgrade and overhaul	-		271,011	**271,011**
6	Spillway piezometer	-		12,800	**12,800**
7	Conduit – inspection and condition assessment	14,000	288,209	-	**288,209**
Total		**2,777,919**	**1,343,604**	**4,450,674**	**5,794,278**

We have sighted the tender evaluations for:

- Valve refurbishment
- Outlet tower crane upgrade
- Spillway drain cleaning

For these tenders, a through tender evaluation process was undertaken by an experienced consultant. We understand that subsequent to the consultant's tender evaluation of the Outlet Tower Crane Upgrade, GAWB undertook additional consultation with the tenders and subsequently awarded the contract to a tenderer different to that recommended in the Tender Evaluation. We consider the additional discussion with the tenderers resulted in a better outcome for GAWB than would otherwise have been the case in absence of these discussions. We therefore consider that as the original costs were market tested, they are efficient and in line with market conditions.

The following table outlines the awarded contracts, their original values and their final contact values (including variations).

Table G.6: Awarded contracts ($ including GST)

Contractor	Aspect	Original Contract Value	Final Contract Value	Difference
RCR Resources (Eagle) Pty Ltd	Valve refurbishment – Part A	783,210	880,860	97,650
Temmco	Valve refurbishment – Part B	659,173	719,108	59,936
Kone Cranes	Crane works	157,770	272,881	115,111
Hydrojet Systems	Spillway drain cleaning	408,035	968,993	560,959
Monadelphous	Supply of New Screens, Grapple and Baulk Modifications	141,223	155,886	14,663
Pacific Marine Group	Modification of Stop Bracket (Inlet 6)	23,060	40,510	17,450
Aestec Pty Ltd	Internal Inspection, Clean & Paint 7 Inlet Pipes	143,889	143,889	-
	Intake Tower Vertical Pipe Inspection	48,923	48,923	-
	Corrosion repairs to pipework within Intake Tower	280,473	280,473	-
GHD	WP1 - Valve Overhaul	581,700	1,139,893	558,193

Contractor	Aspect	Original Contract Value	Final Contract Value	Difference
	WP2 - Intake Tower Crane Upgrade	190,545	442,317	251,772
Total		**3,418,001**	**5,093,733**	**1,675,734**

We have not sighted (or requested) documentation relating to the procurement process followed for the contracts awarded to Monadelphous or Pacific Marine Group Modification. In addition, no documentation has been provided for the 'Internal Inspection, Clean & Paint 7 Inlet Pipes' works awarded to Aestec Pty Ltd. It is noted that the 'Intake Tower Vertical Pipe Inspection' and 'Corrosion repairs to pipework within Intake Tower' works were awarded to Aestec Pty Ltd under a Standing Offer Agreement. We consider that sole sourcing this work may not have resulted in efficient costs, as, by definition, the offer submitted by Aestec Pty Ltd was not market tested. For the project values between $10,000 and $250,000, according to GAWB's procurement process, three quotations would have been required.

As indicated in Table G.6, the majority of the contracts increased from their original value. A number of variations were received on the majority of the contracts. The major variations on the project were:

- From discussion with GAWB, we understand that the Hydrojet variation (of approximately $561,000) was the result of an initial underestimation of the number drain holes in the spillway that needed to be drilled. We consider that the number drain holes that required drilling could not have been accurately determined prior to commencing work and therefore consider the variation to be reasonable.
- The *Board paper - Variation to the Dam Safety Compliance Program of Works* (GAWB, 26 May 2011) identifies that the Variation to WP1 (of approximately $560,000) was required to complete the valve refurbishment program of works, including assisting with design modification, technical advice, superintendence and contract administration. The majority of the works were associated with increased scope of works, or additional works that were not originally budgeted for. We consider that the variation has been well documented, in the *Revised Proposal for Awoonga Dam: Valve Refurbishment Project - Technical Assistance and Superintendence* (GHD, undated) and evidence of submittal to and approval by GAWB's board has been sighted.
- The *Board paper - Variation to the Dam Safety Compliance Program of Works* (GAWB, 26 May 2011) identifies that the Variation to WP2 (of approximately $260,000) was required to provide technical advice and act as superintendent for the crane design and installation contract. The works included: preparation of initial concept for grappling system, job management, crane supporting structure capacity check, crane inspection and refurbishment works, and new grappling system and fine screen. We consider that the variation has been well documented, in the *Proposal for Awoonga Dam Intake Tower Crane Upgrade Engineering Services* (GHD, 28 October 2010) and evidence of submittal to and approval by GAWB's board has been sighted.

The other variations were minor in comparison and are considered reasonable. All scope changes and variations appear to have been well managed and documented.

We note that that contract values identified in Table G.6 are in excess of the total project value *Capital Expenditure Review – QCA* (Cardno, 23 September 2014), $5.09 million vs $4.44 million. We understand that some of the some of the expenditure is operational rather than capital. Based on the information provided, we consider the $4.44 million outlined in the *Capital Expenditure Review* to be efficient.

G.9 Capex trade-offs with opex (substitution possibilities)

No substitution possibilities between capex and opex or non-network solutions are possible for this project, as capital works are required to meet the regulatory requirements.

G.10 Efficiency gains

No efficiency gains have been identified for this project.

G.11 Implications for operating expenditure

We consider that there will be limited implications for operating expenditure as a result of this project as the majority of the works are refurbishments or like for like replacements.

G.12 Policies and procedures

We consider that with respect to the appointment of the main contractor GAWB's policies and procedures have been complied with for the following reasons:

- All documentation required under GAWB's capital delivery processes has been sighted for this project, as detailed in Section G.4
- A tendering process was adopted for the main contracts as per GAWB's purchasing policy

However, we are unable to conclude that GAWB's purchasing policy was followed with respect to the sole supplier invitation for:

- The provision of project management services by GHD
- The provision of services by Aestec Pty Ltd

G.13 Assessment of reported expenditure

Table G.7 below identifies the revised capex for Dam Safety Compliance Works.

Table G.7: Dam Safety Compliance Works revised capex ($'000)

Source	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Total
Original value						4,444	**4,444**
Jacobs proposed value						4,444	**4,444**
Variation (to original value)						-	**-**

G.14 Extrapolation to other projects

As noted above, two aspects of this project were sole sourced. We consider that sole sourcing this work may not have resulted in efficient costs. This is discussed further in the main body of the report.

G.15 Summary/conclusions and recommendations

G.15.1 Summary

Table G.8 presents an overview of the findings of the prudency and efficiency of the project.

Table G.8: Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
Dam Safety Compliance Works	Prudency		The project is assessed as prudent as the primary driver of Compliance with legal obligation has been demonstrated through the requirement to meet the Dam Safety Management Guidelines for a referable dam under the *Water Supply (Safety & Reliability) Act*.
	Efficiency		The project is assessed as efficient. The scope is appropriate and the standards of works are considered to be consistent with industry practice. The majority of the costs associated with the principal contracts are consistent with prevailing market conditions. Variations have been well documented and approved following appropriate processes. However, we consider that the sole sourcing of project management and technical services may not have resulted in efficient costs as, by definition, the offer submitted by these suppliers was not

			market tested.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient)

G.15.2 Recommendations

We recommend that the allowed efficient expenditure be $4.44 million.

Appendix H. North Industrial Zone Potable Upgrade

H.1 Executive summary

The North Industrial Zone Potable Upgrade project involves increasing the capacity of the North Industrial Zone to meet demand commitments from customers currently served by the Yarwun Water Treatment Plant (YWTP). These demand commitments exceed the available capacity of the plant. It is proposed that the required increase in capacity to meet these commitments is achieved by installing a pipeline to connect the north industrial area with the Gladstone Water Treatment Plant (GWTP).

A related project, the Yarwun Water Treatment Plant (YWTP) upgrade, was reviewed by the QCA in 2010. This project was to upgrade the capacity of YWTP from 3.8 ML/d to 5 ML/d. It had a value of $2.59 million and the QCA report prepared at the time states that it was completed in 2008. This 2010 review concluded that the expenditure was appropriate and the QCA therefore proposed that the costs of the YWTP upgrade be included in the asset base.

From our analysis of the documentation provided we conclude that the North Industrial Zone Potable Upgrade project is **prudent** and **efficient**. An overview of the findings of the prudency and efficiency of the project is presented in Table H.1.

Table H.1 : Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
North Industrial Zone Potable Upgrade	Prudency		The project is assessed as prudent as the need for the project has been demonstrated; the YWTP is currently at, or beyond capacity, and a solution is required to maintain supply to customer in the North Industrial Zone.
	Efficiency		The project is assessed as efficient. The indirect cost allowances used in the GAWB cost estimate are high and we have recommended that GAWB reviews the establishment and mobilisation/demobilisation cost, which is based on 28% of the direct costs. However, the project costs are within +30% of our order of magnitude benchmark costs and are hence deemed efficient.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient),
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency), and
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient).

H.2 Project description

The project involves an increase the capacity of the North Industrial Zone to meet demand commitments from customers currently served by the Yarwun Water Treatment Plant (YWTP). These demand commitments exceed the available capacity of the plant. GAWB has proposed that the required increase in capacity to meet these commitments is achieved by installing a pipeline to connect the north industrial area with the Gladstone Water Treatment Plant (GWTP).

A related project, the 'Yarwun Water Treatment Plant (YWTP) upgrade', was reviewed by the QCA in the 2010. The 2010 QCA report states that the capacity of YWTP was upgraded to 8.6 ML/d, an increase of 5 ML/d, completed in 2008. This QCA 2010 review concluded that the expenditure, of $2.59 million, was appropriate and the Authority therefore proposed that the costs of the YWTP upgrade be included in the asset base.

Following receipt of information by us from GAWB for this 2015-20 review, we note a discrepancy in the capacity of the YWTP post 2008 as all current documentation stated the plant's capacity as 5 ML/d. Clarification from GAWB indicates that the YWTP was upgraded from 3.8 ML/d to 5 ML/d in 2008/09, with incorrect

information included in the QCA's 2010 report. We therefore have undertaken our analysis of the proposed increase in capacity based on a YWTP capacity of 5 ML/d.

H.3 Proposed capex

Table H.2 shows the proposed cost of the North Industrial Zone Potable Upgrade project within the 2015 to 2020 budgets.

Table H.2 : North Industrial Zone Potable Upgrade project proposed capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
'Upgrade of Potable Supply to the Northern Industrial Area' (GAWB, 15 April 2015)							**6,600**
'GWTP / YWTP System Interconnection Options Study' (Aurecon, 20 January 2014)							**6,349**

The difference between the cost included in the *'GWTP / YWTP System Interconnection Options Study'* (Aurecon, 20 January 2014) and the *'Upgrade of Potable Supply to the Northern Industrial Area'* (GAWB, 15 April 2015) is $300,000 identified by GAWB capitalisation of corporate costs.

No distribution of the expenditure over the review period has been provided.

H.4 Documentation reviewed

The key reference documents used for this review are:

- *Outline Program for Delivery YWTP Interconnection* (GAWB, no date)
- *Upgrade of Potable Supply to the Northern Industrial Area* (GAWB, 15 April 2015)
- *Memorandum RE: Amendment to Project Plan - IPD2013-029: GWTP YWTP System Interconnection Project* (GAWB, 8 April 2015)
- *Letter to GAWB RE: Yarwun Water Supply Agreement* (Rio Tinto Alcan, 17 February 2015)
- *Letter to Rio Tinto Alcan RE: Water Supply Agreement* (GAWB, 12 February 2015)
- *Board Paper No.: 2014-07-2.07 - Yarwun Water Treatment Plant Capacity* (GAWB, , 2 July 2014)
- *Committee Paper No.: 2014-02-4.02 - Water Treatment Plant Capacity and Network Development* (GAWB, 4 February 2014)
- *GWTP / YWTP System Interconnection Options Study* (Aurecon, 20 January 2014)
- *2015 Price Monitoring Investigation - Submission to the Queensland Competition Authority* (GAWB, September 2014)
- *Strategic Water Plan* (GAWB, November 2013)
- *Project Plan – IPD2013-029 GWTP/YWTP System Interconnection Options Study* (GAWB, 8 July 2013)
- *Yarwun WTP Upgrade Options and Preliminary Design Report* (MJM Environmental Pty Ltd, 25 June 2013)
- *Project Justification Form – GWTP / YWTP System Interconnection* (GAWB, 8 May 2013)
- *Capital Cost Estimate and Work Description Hanson Road Raw Water Pipeline Remediation* (Aurecon, 21 June 2011)
- *Gladstone Area Water Board: Investigation of Pricing Practices* (QCA, June 2010)

H.5 Key drivers

The primary driver identified for this project is growth, with legal obligation a secondary driver.

The primary driver is supported by GAWB's current contractual commitments, based on customer demand commitments, in the Northern Industrial Area totalling 5.3 ML/d (GAWB, 15 April 2015). This exceeds the plant's available capacity of 5 ML/d. In addition, correspondence between GAWB and Rio Tinto Alcan indicates that, Rio Tinto Alcan intends to increase its annual demand from July 2016 to 9,944 ML/a (from 9,917 ML/a, an increase of 27 ML/a).

The secondary driver is supported by statements that the plant is operating at the limits of its design parameters to produce water compliant with the Australian Drinking Water Guidelines and GAWB's Drinking Water Quality Management Plan during high turbidity events (MJM Environmental Pty Ltd, 25 June 2013). The *'Committee Paper No.: 2014-02-4.02 - Water Treatment Plant Capacity and Network Development'* (GAWB, 4 February 2014) states:

> *"the extreme rainfall events of January 2013, which saw the turbidity of raw water increase from less than 20NTU to over 400NTU. The performance of both WTPs was adversely affected by this incoming water quality, particularly YWTP which was unable to maintain potable water quality to our customers. The effects of high turbidity raw water continued well into 2013."*

Although evidence of the spike in raw water turbidity (at a maximum of 409 NTU) in the Awoonga Dam during the January 2013 weather event associated with Tropical Cyclone Oswald has been provided, the actual quality of water produced by the plant during this period has not been sighted. As such, the secondary driver has not been fully demonstrated.

We therefore consider the primary driver of growth to be appropriate as the treated water demand exceeds the capacity of the YWTP. In summary, the project meets the QCA's definition of prudency as it is required to support growth within the region.

H.6 The scope of works

H.6.1 Solutions development

The 'Upgrade of Potable Supply to the Northern Industrial Area' document (GAWB, 15 April 2015), identifies that two options were identified to address the risks of maintaining security of water supply and maintaining potable water quality. These were:

- Option 1: Upgrade of the YWTP to increase capacity to 8.8 ML/d
- Option 2: Interconnection of the North Industrial Area with the GWTP

The two options were explored in depth in separate investigations: the *'Yarwun WTP Upgrade Options and Preliminary Design Report'* (MJM Environmental Pty Ltd, 25 June 2013) and the *'GWTP / YWTP System Interconnection Options Study'* (Aurecon, 20 January 2014), with both identifying a number of different potential options.

For the upgrade of the YWTP, the options considered were:

- Constructing a new conventional treatment train with conventional clarification and filtration;
- Constructing new separate flocculation, dissolved air flotation (DAF) and filtration stages; and
- Constructing a new in-filter dissolved air flotation (DAFF) plant.

The upgrade options were assessed against a number of criteria, including treated water quality, engineering elements, operational elements, workplace health and safety factors, environmental factors and financials. From analysis of the options, the preferred upgrade option selected by GAWB was the construction of a new

conventional treatment train as it had the highest score from the evaluation based on technical and financial criteria. It has the potential to meet all treated water targets and had the lowest life cycle cost.

For the interconnection of the North Industrial Area with the GWTP, two options were considered:

- Construction of a new Gladstone Mt Larcom Road treated water main; and
- Conversion of existing Gladstone Mt Larcom Road main to treated water.

The two interconnection options were assessed against a number of criteria, including advantages, disadvantages, risks, constructability, environment issues and cost. The conversion of existing Gladstone Mt Larcom Road main to treated water was the preferred as it was the least cost option, had the least impact on the natural and built environment and was dependent only on GAWB's program to implement the project.

Whilst the assessment of the two higher level individual options is comprehensive, the isolated manner in which the investigations were conducted (i.e. by different consultants) provides limited evidence of a detailed options analysis between the two preferred options. The 'Upgrade of Potable Supply to the Northern Industrial Area' document (GAWB, 15 April 2015) a summary of the options evaluation which states:

> *"The preferred option is Option 2:*
>
> - *Conversion of the remaining portion of the Hansen Rd pipeline to potable use to supply additional potable water to the North Industrial area utilising spare capacity at the Gladstone Water Treatment Plant; and,*
> - *Construction of new raw water spurs from the Mt Miller pipeline to customers currently taking raw water from the Hansen Rd pipeline.*
>
> *The interconnection option allows for:*
>
> - *future augmentation at low cost;*
> - *improves supply security in the north industrial area;*
> - *slightly improves the average quality of potable water supplied; and*
> - *provides a higher level of confidence of maintaining potable water standards during high turbidity events.*
>
> *The analysis concluded that there is no material difference between the two options in terms of capital cost however Option 2 has a significantly more favourable price per ML impact, approximately 30% less in dollar per ML terms, due to the differing effective life of each option (approximately 70 years for pipe; 25 years for treatment plant upgrade)."*

Table H.3 : Options evaluation

Evaluation Criteria	Option	
	Interconnection	**Yarwun WTP Upgrade**
Price impact	Lower cost	High cost
Security of supply	Enhanced	No change
Operational flexibility	Enhanced	No change
Water quality	Exceeds Australian and GAWB standards. Demonstrated ability to cope with very turbid raw water.	Meets Australian and GAWB standards. Questionable ability to cope with very turbid raw water.
Upgradability (for volume)	Low cost	High cost

Evaluation Criteria	Option	
	Interconnection	Yarwun WTP Upgrade
Capital cost ($)	$6.3 million	$6.4 million ($4.4 million for YWTP upgrade + $2.1 million for raw water supply)
Operating cost ($/a)	NA	$154,867

Source: *'GWTP / YWTP System Interconnection Options Study'* (Aurecon, 20 January 2014), *'Yarwun WTP Upgrade Options and Preliminary Design Report'* (MJM Environmental Pty Ltd, 25 June 2013), *'Capital Cost Estimate and Work Description Hanson Road Raw Water Pipeline Remediation'* (Aurecon, 21 June 2011)

Although we consider the option selected to be appropriate (from our high level review), the project would have benefited from a documented standalone options analysis. This would confirm that a similar approach was taken for both solutions, which allows for direct comparison, and that assumptions regarding whole of life costs, operating costs, risk and contingency were consistent across both options analysed and are adequately addressed.

The scope of Option 2 includes:

- New RG Tanna Coal Terminal (RGTCT) raw water supply comprising new DN315 PE main connecting to the Mt Miller main within airport land to the south of the Callemondah Rail Yard, aligned across the yard and along Red Rover Road to connect into the existing raw water main / RGTCT connection located adjacent the Curtis Island Booster Pump Station
  - New Wiggins Island Coal Export Terminal (WICET) raw water supply, comprising 1.4 km of new DN315 PE100 PN16 main, connecting to the existing WICET Point of Supply and extending west to reconnect to the existing raw water main on the northern side of Gladstone Mt Larcom Road
  - Conversion of the existing Gladstone Mt Larcom Road raw water main to treated water, requiring:
  - New 50 m section of DN400 PE100 PN16 connection at eastern end into the Curtis Island treated water network immediately downstream of the Booster Pump Station
  - New 800 m section of DN400 PE100 PN16 connection at the western end into the treated water system downstream of the YWTP
  - Modifications to the Curtis Island Booster Pump Station and YWTP system control systems to allow for both gravity and pumped flows within the new network

H.6.2 Project delivery

GAWB has stated that the project will take approximately 15 months to complete (GAWB, 15 April 2015) and the following indicative program was provided to us by GAWB.

Table H.4 : Indicative program

Stage description	Deliverable	Program	Deliverable
Internal Project Approvals	Business Case (Scope, Program & Budget)	March 2015	GAWB
Preliminary Design	PFD, Pipe alignment and size	April May	Consultant (Aurecon)
Land (+ Cadastral Survey if required)	Access to pipeline corridor (Road reserve)	June 2015 - February 2016	GAWB or Consultant
Topographic Survey	Topographic & detailed engineering survey	June 2015	Surveyor (TBA)
Detail Design	Mt Millar Pipe to RGT outlet	July 2015 – Sept 2015	Consultant (Aurecon)
	YWTP to WICET	Sept 2015 – Nov 2015	Consultant (Aurecon)
	CI Booster to YWTP	Nov 2015 – Jan 2016	Consultant (Aurecon or GHD)

Stage description	Deliverable	Program	Deliverable
Construction Procurement & Materials Supply	Mt Millar Pipe to RGT outlet	Oct 2015 – Jan 2016	GAWB
	YWTP to WICET	Nov 2015 – Feb 2016	GAWB
	CI Booster to YWTP	Feb 2016 – March 2016	GAWB
Construction	Mt Millar Pipe to RGT outlet	Jan 2016 – March 2016	Contractor
	YWTP to WICET	March 2016 - April 2016	Contractor
	CI Booster to YWTP	April - May 2016	Contractor
Cut Over & Commission	Mt Millar Pipe to RGT outlet	March 2016	GAWB & Contractor
Cut Over & Commission	YWTP to WICET CI Booster to YWTP	June 2016	GAWB & Contractor

Source: *'Outline Program for Delivery YWTP Interconnection'* (GAWB, no date)

Jacobs considers the program to be realistic and achievable.

H.7 Standards of service

No details have been provided regarding the standard that the works will conform to. It is expected in keeping with the status of GAWB as a regulated water utility in Australia, that the design would comply with the requirements of applicable legislation and guidelines, such as:

- Australian Standards, such as:
  - AS/NZS 2033:2008 Installation of Polyethylene Pipe Systems
  - AS 4041 Pressure Piping
- WSAA codes, such as:
  - WSA 01-2004 Polyethylene Pipeline Code
  - WSA 03-2011 Water Supply Code of Australia
  - WSA 05-2013 Conduit Inspection Reporting Code of Australia

Whilst we have seen no documentary evidence to enable us to state categorically that GAWB's design is compliant, from other evidence we have seen on capital construction projects, we draw the conclusion that GAWB adopts good practice and hence we are confident that necessary legislation and guidelines for pipeline construction will be adhered to.

H.8 Project cost

A Class 3 cost estimate was been developed for the project by GAWB's consultant. A Class 3 cost estimate typically has an accuracy range between -10%, +20%. The following table presents an overview of these estimates.

Table H.5 : Budget cost estimate ($)

Aspect			Cost ($)
Direct Materials & Labour			3,167,962
Indirect Costs (on Direct Costs)	Establishment & Mob/Demob	28%	887,029
	Contractor's OH&P	15%	475,194
	Eng / Design / Project Mgmt	8%	253,437
	Construction Management	6%	190,078

Aspect			Cost ($)
	Owners Costs	10%	316,796
Sub-Total			**5,290,497**
Risk and Contingency		20%	1,058,099
Total			**6,348,597**

Source: *'GWTP / YWTP System Interconnection Options Study'* (Aurecon, 20 January 2014)

We consider that some of the indirect cost allowances used in GAWB's cost estimate are higher than industry standards, and result in an overall total cost at more than double the direct costs. When queried on the on the percentages applied GAWB stated:

> *"We cannot comment on the application of the percentages applied by Aurecon. Given the study is preliminary and not definitive there will be significant variation to the final cost"*

GAWB further referred to the '*GWTP / YWTP System Interconnection Options Study'* (Aurecon, 20 January 2014), which states:

> *"Since Aurecon has no control over the cost of labour, materials, equipment or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, any estimate of costs is made on the basis of Aurecon's experience and qualifications and represents its best judgement as an experienced and qualified professional engineer, familiar with the construction industry; but Aurecon cannot and does not guarantee that proposals, bids or actual construction cost will not vary from Aurecon's opinion of cost.*
>
> ***Basis of information***
>
> *This opinion of cost was based on the Figures presented in this Report and typical rates for the identified major items of works.*
>
> ***Limitations***
>
> *This opinion of cost is limited to the high level conceptual "alignment" layouts developed to date, with*
>
> - *No detailed modelling to confirm pipe size and class requirements*
> - *No geotechnical investigation has been performed*
> - *No site survey has been performed*
> - *No identification of other services that may impact on alignment and construction*
> - *No stakeholder consultation with affected service authorities, land owners/occupiers, or approval bodies*
> - *Opinions of cost are preliminary and for "comparative" purposes only"*

We consider that there is merit in GAWB questioning the 28% establishment and mobilisation/demobilisation cost applied in the cost estimate provided by its consultants with a view to seeking a greater understanding of the make-up of this estimate. We consider that GAWB, as the owner and operator of the assets, will have a good understanding of the costs associated with work in the region, nevertheless, we are of the opinion that the allowance is high, even taking into account the unique aspects of undertaking construction work in and around Gladstone. It may be that GAWB's consultant's uplift for site establishment and mobilisation/demobilisation represents an historical reflection of the high accommodation and other site camp establishment costs in Gladstone at the height of LNG construction at Curtis Island. Jacobs recommends that GAWB reviews works recently completed to determine if 28% allowance for establishment and mobilisation/demobilisation is still appropriate.

Jacobs considers that the indirect cost allowances applied to the GAWB cost estimate to be higher than expected. By comparison, indirect cost allowances that we consider to be more in keeping with industry standards are outlined in the table below.

Table H.6 : Revised indirect cost allowances

Aspect	GAWB	Revised	Difference	Comment
Establishment & Mob/Demob	28%	5-8%	-25%	We consider this to be high and believe a range of 5-8% to be reasonable.
Contractor's OH&P	15%	N/A	N/A	In our estimate, the contractor's profit margin is included in the direct cost estimate. We have moved the allowance for contracts OH&P to direct costs to allow a direct comparison with our estimate.
Eng / Design / Project Mgmt	8%	8%	0%	We consider this to be reasonable.
Construction Management	6%	6%	0%	We consider this to be reasonable.
Owners Costs	10%	5%	-5%	We consider this to be high and believe of 5% to be reasonable.

In order to benchmark GAWB's order of magnitude costs, we have developed a 2014 cost base order of magnitude (-20%, +40%) cost estimate for the works. Our cost estimates are based on recent unit rates and projects undertaken by us. In developing the cost estimate, a project management allowance of 15% of direct costs and a contingency allowance (for variations due to construction unknown at this stage) of 10% of direct costs have been adopted.

Table H.7 : Jacobs cost estimate ($)

Aspect	Cost ($)
Capex	$4,195,000
Project Management & Contingency (@ 35%)	$1,468,250
Total	**$5,663,250**

Note: Values rounded to nearest thousand.

A comparison between GAWB's and our cost estimates are presented in the table below.

Table H.8: Comparison of cost estimate ($)

Aspect	GAWB	Jacobs	Difference	
			Value	Percentage
Direct Costs	$3,167,962	$4,195,000	$1,027,038	32%
Indirect Costs (including contingency)	$3,180,634	$1,468,250	-$1,712,384	-54%
Total	**$6,348,596**	**$5,663,250**	**-$685,346**	**-11%**

Jacobs cost estimate is approximately 30% higher than GAWB's for the direct costs, but over 50% lower for indirect costs (including contingency). However, the overall difference between the estimates is 11%, which is within 30% of our cost estimate; as such we consider GAWB's costs of $6.35 million to be efficient.

As the value of the works is in excess of $500,000, we understand that, under GAWB's procurement processes, an open tender or expression of interest (or similar) process will be undertaken for the procurement of the works. As such time and assuming sufficient competitive bids are received to demonstrate competition, the value of the works will be market tested.

We note that in the summary document, *'Upgrade of Potable Supply to the Northern Industrial Area'* (GAWB, 15 April 2015), identifies $300,000 of corporate costs capitalised. In response to a query regarding this expenditure GAWB stated:

> *"Corporate Costs of $0.3m reflect the allocation of owners costs to the project that have occurred and will occur. Given that the project is an early stage investigation the allocation of corporate costs is an estimate based on experience."*

Based on the information provided to date, and given that GAWB's costs are within +30% of our benchmark costs, we consider that GAWB's projected costs of $6.65 million are efficient. However, we recommend that, given the project is currently in the early stages, the project be reviewed again once the project has progressed in detail and certainty.

H.9 Capex trade-offs with opex (substitution possibilities)

No evidence of GAWB's review of capex trade-offs with opex solutions options have been presented to us.

H.10 Efficiency gains

No efficiency gains have been identified for this project.

H.11 Implications for operating expenditure

The implications for operating from the implementation of this option have not been provided. However, it is understood that the interconnection system can operate in two modes, being gravity and pumped. The two modes are:

- Gravity: There is sufficient head available in the Gladstone network to deliver up to 4 ML/d to the Yarwun network under gravity from South Gladstone reservoir.
- Pumped: For flows greater than 4 ML/d, up to a maximum of 9 ML/d (likely to be required when YWTP offline), the water will need to be pumped from the Curtis Island Pump Station to the Yarwun network.

The *'GWTP / YWTP System Interconnection Options Study'* (Aurecon, 20 January 2014) does not include operating expenditure estimates. As such the implications for operating expenditure are uncertain at this point in time.

H.12 Policies and procedures

For this project a budget estimate and a Project Justification Form have been provided by GAWB. This is in keeping with the level of documentation that we would expect to be available at this stage of the project. We note that a Project Plan was provided, although for the Options Study only. We anticipate that as the project progresses additional documentation including: Project Plan; Business Case; planning documents and reports; contract documents and reports; and a Project Closure Report, will be developed.

H.13 Assessment of reported expenditure

Table H.9 below identifies our recommended capex for the North Industrial Zone Potable Upgrade project.

Table H.9 : North Industrial Zone Potable Upgrade project revised capex ($'000)

Source	2015/16	2016/17	2017/18	2018/19	2019/20	Subsequent years	Total
Original value							**6,649**
Jacobs proposed value							**6,649**
Variation (to original value)							**0**

H.14 Extrapolation to other projects

Given the unique nature of the project Jacobs does not consider that the findings can be extrapolated to other projects.

H.15 Summary / conclusions and recommendations

H.15.1 Summary

Table H.10 presents an overview of the findings of the prudency and efficiency of the project which we assess as being **prudent and efficient**.

Table H.10 : Summary of prudency and efficiency

Project	Assessment	Outcome	Summary
North Industrial Zone Potable Upgrade	Prudency		The project is assessed as prudent as the need for the project has been demonstrated; the YWTP is currently at, or beyond capacity, and a solution is required to maintain supply to customer in the North Industrial Zone.
	Efficiency		The project is assessed as efficient. The indirect cost allowances used in the GAWB cost estimate are high and we have recommended that GAWB reviews the establishment and mobilisation/demobilisation cost, which is based on 28% of the direct costs. However, the project costs are within +30% of our order of magnitude benchmark costs and are hence deemed efficient.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the project is prudent/efficient),
- Yellow indicates that the assessment criteria have been partially met (i.e. the project does not fully met all criteria associated with prudency/efficiency), and
- Red indicates that the assessment criteria have not been met (i.e. the project is not prudent/efficient).

H.15.2 Recommendations

We recommend that the allowed efficient expenditure be $6.65 million.

Appendix I. Opex – staff costs, operations

I.1 Executive summary

Table I.1 presents an overview of the findings of the prudency and efficiency of the expenditure item Staff Costs, Operations which we find to be prudent but not efficient.

Table I.1: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Maintenance	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to supply the proper quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.
	Efficiency		Operations FTEs have increased from under 16 FTEs in 2010 to 23.5 FTEs in 2014. We are of the opinion that an increase in 7.2 FTEs only from the 2010 level is justified for operations based on the additional responsibilities and obligations of the organisation. This is due to the implementation of the DWQMP as well as the requirement for 24 hours 7 days operation at the WTPs. The difference between the number of FTEs we consider efficient and the number of FTEs proposed by GAWB, as being 0.3FTEs, is not considered material.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

I.2 Overview of opex

Table I.2 provides the actual Staffing expenditure for Operations (in real 2015$) between 2010 and 2015. The costs are based on data provided in GAWB's submission *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority, Appendices Volume One*, Appendix F which contains the report provided to GAWB by its consultant, GHD.

Table I.2: ALCM – Actual staffing opex[7]

Real $2015	2011	2012	2013	2014	2015
Staffing cost – Operations ($'000)	1,944	1,949	2,303	2,412	2,568
Annual increase		0.3%	18.2%	4.7%	6.5%
QCA 2010 allowed Operations staff cost ($'000)	1,681	1,669	1,613	1,652	1,694

The most significant increase in staffing cost occurred in 2013 when expenditure in staff costs for Operations rose by over 18% from the previous year. Over the period 2011 to 2015, GAWB's staffing costs for Operations increased by over 32%. The expenditure is also significantly in excess of the level of expenditure allowed by the QCA in its 2010 price determination. Over the whole period, GAWB spent approximately $3 million more than that allowed by the QCA in staffing costs for Operations.

[7] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, Appendix C

In 2013/14, GAWB employed a total of 89 individuals allocated to six business units. The Executive Business Unit is headed by the Chief Executive Office and comprises of 4 employees including the CEO. The Commercial Business Unit is led by the Chief Financial Officer with a supporting staff of 9 and Human Resources Manager leads a small team of two other staff. The Corporate Services Business Unit is managed by the Corporate Services Manager with a total staff of 22 including 3 Hatchery Technicians and a Fisheries Manager. The largest business unit is Water Supply Services - Operations & Maintenance with a total of 35 staff led by the O&M Manager. Water Supply Services - Infrastructure Planning & Delivery is the final business unit with 14 positions, one of which is occupied by two individuals. The unit is headed by the Infrastructure Delivery Manager.

Total staff cost for GAWB in 2015 is budgeted by GAWB to amount to $9.9 million. GAWB's allocation of staffing costs to Operations amounts to $2.9 million.

Table I.3 shows the proposed cost of staff cost within the 2015 to 2020 Operations budget.

Table I.3: Operations – Staffing proposed opex (nominal)

Source	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
GAWB, 2015 Price Monitoring Investigation Submission to the Queensland Competition Authority, September 2014, Table 16, page 21	2,970	3,061	3,162	3,272	3,397
GHD, Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review, Appendix C	2,602	2,619	2,641	2,670	2,708

The staff costs forecast from GAWB's consultant's report[8] are in real FY2015$ terms. The staff costs forecast submitted by GAWB in its submission to the QCA are in nominal $ terms. After adjusting for an assumed 2.5% inflation rate (change in CPI), we note that the cost forecasts from GAWB's submission is greater (by over $300,000 p.a. over the five years) than that provided by GAWB's consultant. Our analysis below is based on GAWB's submission, therefore, rather than on GAWB's consultant's figures.

It is also noted that these expenditure items specifically exclude Curtis Island related expenditure which is the subject of a separate confidential submission to the QCA.

I.3 Documentation reviewed

The key reference documents used for this review are:

- GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, September 2014
- GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
- 2.a FTE reconciliation.xlsx
- 2.c Mvmt in FTEs.xlsx
- 3. TEC Split.xlsx
- O5.1 Operations staffing summary - includes historical costs and forecast.pdf
- O5.3 Operations TEC forecast detail

[8] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014

- O5.5 Board Paper - Treatment Plant Operating Regime.pdf
- O5.6 Paper - Operator roster and shift allowance.doc
- Copy of EDOCS_n283839_v1_FTE_info_QCA_opex_by_year_xlsx.xlsx
- Copy of FY14 labour actual functional split.xlsx
- O8.2.1 Mercer market movements letter.pdf
- O8.7 GAWB Recruitment process.pdf
- O8.9.2 Fitters and Electricians.pdf
- O8.9.6 Extract from edocs 223583 Restructure of OM Specialist role appointment of OM Manager.pdf

I.4 Prudency

The employment of competent staff to operate its infrastructure is a core function for GAWB. The employment of capable personnel is necessary to ensure that GAWB is able to supply the proper quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. We therefore find this expenditure to be prudent.

I.5 Efficiency

In this section we determine if the expenditure is efficient or not efficient.

I.5.1 Calculation of costs

Staff costs are allocated to Operations on the basis of the total employment cost of a position and an estimate of the amount of time spent by staff attending to each of the four core functions identified by GAWB for its business. The four core functions are Asset Life Cycle Management, Operations, Strategy and Asset Creation and Corporate Services. Staff costs allocated to Operations are thus the total employment cost (including wages, overtime, superannuation, leave and other on-costs) multiplied by the percent of time estimated to be spent on operational issues. GAWB estimated the total staff costs for the base year of 2015 and escalated the total costs by its proposed annual escalation factors. The GAWB forecast for staff has been developed on the basis that no additional staff is required over the next regulatory period. With the in-sourcing of maintenance, GAWB had significantly increased its staffing capabilities over the current regulatory period. Between 2011 and 2014, the number of FTEs employed by GAWB increased from 55.35 at the start of the current regulatory period based on the 2010 QCA approved budget to 86.5 FTEs currently employed by GAWB. GAWB expressed the view that this level of staffing is sufficient for the business and it would not be seeking to further increase its staffing levels over the 2016 to 2020 regulatory period.

Table I.4 and Table I.5 provides the breakdown of the expected Operations staff cost. Total employment cost is escalated by GAWB's proposed annual escalation rates while other staff costs is escalated by expected CPI of 2.5% p.a. The forecast is based on Operations employing a staff of 23.54 FTEs.

GAWB's projected annual escalation rate for total employment cost is based on advice from Mercer Consulting Pty Ltd[9]. Data from Mercer is based on its remuneration database for 2013 which contains in excess of 220,000 records representing the remuneration for an incumbent in a specific position. Projections for cost increases in the next regulatory period are based on Mercer's experience in conjunction with official economic indicators including considerations of:

- Increasing cost of living
- Increase superannuation guarantee
- Increasing pressure on productivity levels and

[9] Mercer consulting is a remuneration specialist

- Penetration of short term incentives.

Table I.4: Operations – Total Employment Cost Base Year

Employment Cost	2015 ($'000)
Salaries & Member's Fees & Overtime	2,098
ADO/higher duties	13
Capitalised Wages & On Cost Clearing	-125
Leave - Annual	182
Leave - Long Service	47
Payroll Tax	112
Superannuation - Guarantee	205
Work Cover	36
Total Employment Cost	**2,568**

Table I.5: Operations – Other Staff Cost Base Year ($000)

Other Staff Cost	2015	2016	2017	2018	2019	2020
FBT	$22,850	$23,393	$23,982	$24,583	$25,199	$25,829
Staff Training	$76,143	$77,903	$79,869	$81,874	$83,924	$86,024
Conferences	$3,583	$3,666	$3,759	$3,853	$3,949	$4,048
Labour hire	$150,000	$153,750	$157,594	$161,534	$165,572	$169,711
Relocation expenses	$9,198	$9,411	$9,648	$9,890	$10,138	$10,392
Recruitment	$18,213	$18,634	$19,105	$19,584	$20,075	$20,577
Staff Uniforms	$10,152	$10,387	$10,649	$10,916	$11,190	$11,470
Staff Welfare	$4,812	$4,923	$5,047	$5,174	$5,303	$5,436
Total other staff cost	**$294,951**	**$302,067**	**$309,653**	**$317,408**	**$325,350**	**$333,487**
Total Employment Cost	**$2,567,576**	**$2,667,503**	**$2,751,324**	**$2,844,397**	**$2,946,929**	**$3,063,688**
Total staff cost	**$2,862,527**	**$2,969,570**	**$3,060,977**	**$3,161,805**	**$3,272,279**	**$3,397,175**

Whilst the results of the above calculations based on data GAWB provided in response to our request is consistent with their submission, we note that the escalation rate that that has been applied between 2015 and 2016 is different from GAWB's stated escalation rate in their submission.

I.5.2 Delivery of service

Operation of the bulk water supply infrastructure to deliver treated and raw water to its customers is a core activity for GAWB. Employing appropriately skilled and experienced staff with the capability to be responsible for the operations of the dam, reservoir, pipes and treatment plants is critical to viability of GAWB's business. It is thus considered by us to be appropriate that GAWB in-sources all key operational activities to its internal staff and only utilise contracted labour during times of peak activity like during flood events.

Over the current regulatory period, GAWB has steadily increased its staffing numbers in Operations. The total number of FTEs over this current regulatory period is shown in Table I.6.

Table I.6: Operations FTEs

	2010	2011	2012	2013	2014	2015
Operations FTEs	15.98	19.84	19.64	24.14	23.54	23.54

The increase in FTE is due to GAWB's need to operate the water treatment plants (WTP) at Gladstone and Yarwun on a 24 hours, seven days a week basis as well as to comply with the requirements of the Drinking Water Quality Management Plan (DWQMP) as a result of the implementation of the Water Supply (Safety and Reliability) Act 2008 which increased GAWB's obligations in terms of monitoring and reporting water quality.

While we understand that small WTPs can be operated without a constant human presence, the WTP at Gladstone is a significant installation. Currently the major barrier to remote operations at the Gladstone is the lack of remote operability for its pumps. Human intervention is required to operate the high and low lift pumps in the event of failures or problems. However, GAWB is in the process of re-furbishing its pumps at the Gladstone WTP and this issue should be resolved when that is completed. Another issue the GAWB confronts at the WTPs is the regular incidences of alarms sounding to indicate issues with rate of water flow or issues with water quality. While some adjustments are automatic when these alarms sound, other alarms require a decision regarding whether to shut it off or if the problem requires greater intervention. As alarms can and do sound not just during the day but at any hours, it would be difficult to avoid having an operator on site 24 hours every day unless the SCADA system is improved significantly.

The Gladstone WTP control room also functions as the control centre of the bulk water network. It is thus reasonable to expect that this control room will be operated on a 24 hour basis even if the functions of the WTP may be fully automated for some of the time. It is also our view that is good practice for safety and security reasons, at least two operators, a senior and junior operator are present on site or, at least for the smaller Yarwun WTP, an operator and a security personnel in attendance.

GAWB also operates a hatchery for the purpose of supplying fingerlings to restock Lake Awoonga as part of ameliorative actions taken to minimise the detrimental impacts of the dam construction. The hatchery employs one Fisheries manager with three technicians. The hatchery requires attention and care 7 days a week, including regular feeding and grading (to avoid the bigger fish eating the smaller ones). The number of technicians required depends on the scale of the operations.

I.5.3 Market conditions

The use of staff for all its operational needs means that GAWB has to meet the market for staff wages and benefits. To ensure that GAWB is consistent with market trends, GAWB utilises a report from Mercer Consulting (Australia) Pty Ltd, a remuneration specialist to ensure consistency with market movements in wages and salaries. Mercer's Quarterly Salary Review provides analysis of national remuneration trends, providing remuneration data (including wages, incentive payments and benefits) on over 300 positions in the Australian context. The Mercer Total Remuneration Survey reports covers 1,500 positions in Australia based on job descriptions and Mercer's point based position evaluation method. All positions in GAWB are covered with position descriptions which can be matched to positions included in the Mercer report. Scores based on the position description are developed which are then translated into wage grades that are set based on the appropriate categories in the Mercer report. Salary ranges are set consistent with the report from Mercer while individual salary adjustments are determined based on performance.

Mercer also provides their forecast for wages growth over the next 5 year period on which GAWB has based its proposed annual wage escalators.

I.5.4 Efficiencies and economies of scale

GAWB has not identified any potential efficiency improvements for operations staffing costs in the 2015-2020 regulatory period.

I.5.5 Benchmarking

The use of the Mercer report ensures that GAWB's salaries are consistent with the market. In addition, as part of its submission, GAWB provided a report[10] by Marchment Hill Consulting (MHC) who was engaged by GAWB to conduct an independent Operational Benchmarking Study to provide view of GAWB's opex efficiency relative to a set of comparable peer organisations in the Australian water sector focusing on operational expenditure. Two of the metrics used by Marchment Hill provided comparisons of the number of FTEs employed per unit of water sourced and number of FTEs per unit of mains length. In both these benchmarks Marchment Hill reported that GAWB performed better than its industry peer group ratio average.

Given that staff costs form an integral part of operating expenses of all water utilities and that Marchment Hill Consulting is a respected consultant in the water industry we are of the opinion that GAWB's staff expenditure are within industry norms.

I.6 Trade-offs with capex

GAWB advises that its WTPs require 24 hour 7 day a week manning. We note that its Gladstone WTP also doubles as a network control centre and accept that this control centre requires manning by one experienced operator and a support technician/operator as is in keeping with good industry practice. Plans were made by GAWB to implement lower manning levels at 16 hours, 5 days a week by operating the plants remotely by implementing communications and information technology solutions. However, GAWB has advised that these plans did not proceed to implementation for the following reasons:

- Unreliable plant within the network (including pipeline and communications network failures)
- The existence of single line processes that do not have redundancy within the plant or process in the event of failure
- More than 80% of water supplied to industrial customers have a consistent demand and do not reduce demand during the night or on weekends
- The complexity of and depth of knowledge required to operate the SCADA control network, requiring interpretation of alarms and conditions at the time of the event
- The risk that communications and information technology solutions will not always be available to enable automation of pumping systems and monitoring from an offsite location

Instead GAWB introduced a new shift roster to achieve more effective twenty four hour coverage with the manning available. The preferred roster is one of twelve hour shifts, four on/four off, day/night rotation (multiple staff on day shift, one staff member on night shift). The impact of this change in operating procedure is the requirement for additional WTP operators.

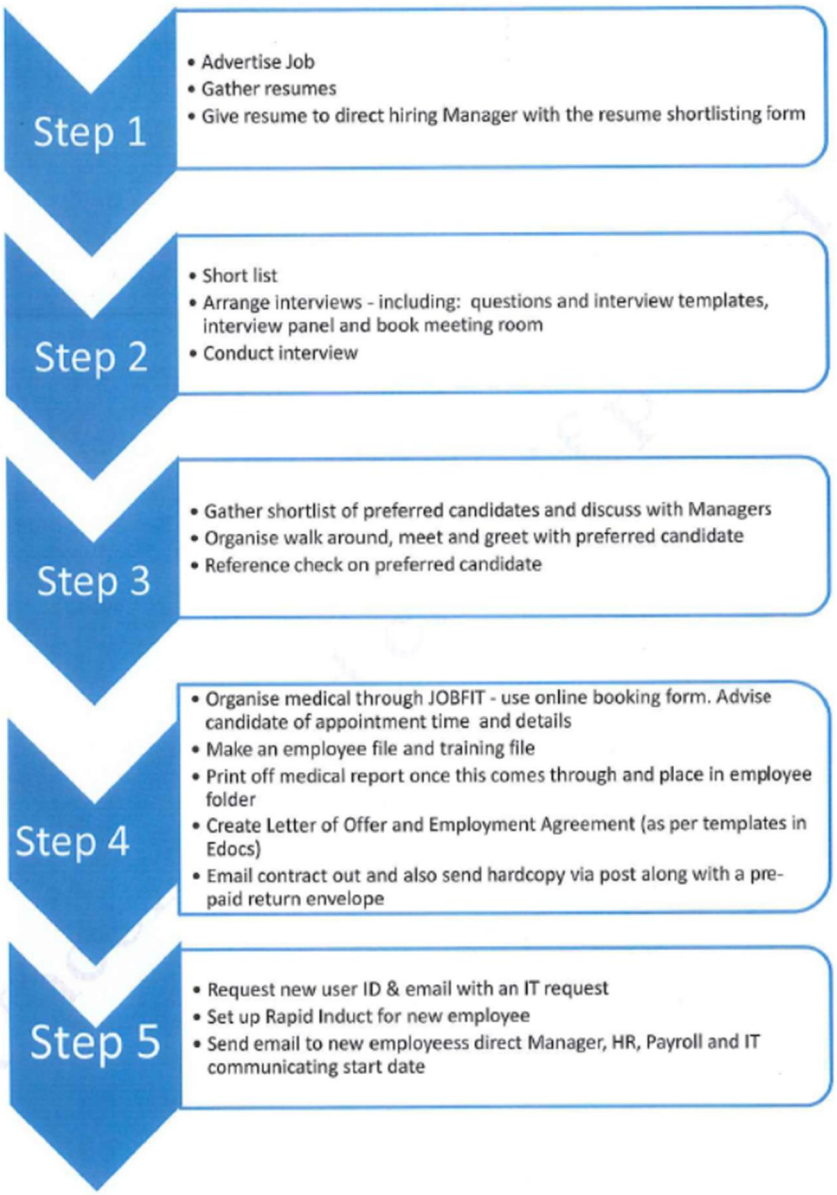
However, we are of the opinion that GAWB's plan to move to a six hours, five days a week operation should be revisited with respect to manning the WTP as opposed to manning the control centre. As GAWB achieves greater knowledge of its network and infrastructure as a consequence of the insourcing of maintenance activities and as it continues the implementation of more preventative maintenance, and the continuing development of automation, communications and information technology solutions, we consider that GAWB should be capable of greater levels of overall operating efficiency future regulatory periods.

I.7 Policies and procedures

Prior to the recruitment of staff, Board approval has to be sought to create additional staff positions. A Board paper has to be developed by the manager responsible and submitted by the CEO to the board for a decision. The paper has to detail the need, financial implications and risk faced by GAWB of creating or not creating the proposed position.

[10] Marchment Hill Consulting, *Gladstone Area Water Board, Operational Benchmarking*, 11 July 2014

GAWB has follows a 5 step recruitment policy illustrated below.



While simple, we consider it to be an appropriate recruitment policy for a small organisation with clear steps from the beginning of the recruitment process to the induction of the recruit. For example, it covers the major issues of recruitment and includes the induction process for a new employee.

For remuneration, GAWB undertakes annual reviews of staff wages on the basis of being competitive with the market for they type of skills required and business location. Wage ranges for staff are based on the Mercer report based on appropriate position descriptions with individual increments based on individual performance. We therefore consider that GAWB employs appropriate good practice in both the recruitment of staff and establishment of appropriate remuneration levels.

I.8 Assessment of reported expenditure

The increase in staff since 2010/11 is due to the change in how the WTPs are operated. Initially in 2010, it was planned that the WTPs would be staffed on a 16 hour 5 day basis. However, this initiative was found by GAWB not to be suitable for the WTP operations given plant reliability, SCADA and communications limitations and a

new roster was introduced to operate on a 24 hour 7day a week basis. In addition, we note that the Gladstone WTP also contains GAWB's system control room. As a result of these limitations, an additional four WTP operators (including two trainees) were recruited. We understand that a total of 10.2 FTEs have been employed by GAWB to operate its WTPs, including the water quality manager and a 0.2 FTE allocation for an automation and control technician,

Based on our previous work in reviewing the operations of WTPs, we are of the opinion that smaller WTPs, similar in capacity to the Yarwun WTP up to the capacity of Gladstone WTP would require between 3 to 5 operators working on a shift basis. Larger WTPs than Gladstone WTP have more than 10 FTE operators employed on a shift basis. The 10.2 FTE operators employed by GAWB for both Yarwun WTP and Gladstone WTP is thus in our opinion in keeping with industry benchmarks.

The implementation of the DWQMP also required the recruitment of an Environmental Scientist who, together with an increase in the allocation of a Technical Officer, resulted in the net recruitment of an additional FTE. An Administrator for Operations and Maintenance was recruited in in 2011 to support the increased responsibilities of the business unit, thus a further 0.5FTE was allocated to Operations. With the increase in responsibility arising from the implementation of the DWQMP we consider that it is reasonable for GAWB to make an additional allocation of 0.5 FTE for support in areas like procurement and contracts.

There has also been an addition of one hatchery technician to provide the necessary staffing level for the hatchery. While a manager and two technicians would constitute the bare minimum number of staff required for such a facility, the addition of another technician will enable the hatchery to ensure that the hatchery receives the required attention and care 7 days a week, including regular feeding and grading of the fish to manage the hatchery efficiently and minimise loss of fish stock.

From our analysis of GAWB's operational requirements, in total, we find that we can justify an increase in staff of another 7.2 FTEs from the staffing level at 2010/11, bringing our assessment of the total staffing requirement for Operations to 23.2 FTEs. Given that there are currently a total of 23.5 FTEs allocated to Operations, we are of the opinion that it is possible to increase efficiency and lower the FTE count by 0.3 FTEs. The differences between GAWB's actual, proposed and recommended FTE count are shown in Table I.7.

Table I.7: Actual, proposed and recommended Operations FTE

	2010	2013	Operations FTE11	Recommended
O&M manager and support	0.75	2.00		1.50
WTP Operations	5.80	10.20		10.20
Other operations	4.70	5.40		5.40
Hatchery	3.00	4.00		4.00
Supporting services	1.73	2.54		2.10
Total	**15.98**	**24.14**	**23.54**	**23.20**

The main difference between our assessments of FTE requirements and GAWB's proposed FTE is the addition by GAWB of two administration officers for Operations and Maintenance that occurred in 2011 and 2014. GAWB proposes that these staff be equally shared between Operations and ALCM whilst in our view most of the increased administrative responsibility would be due to the in-sourcing of maintenance, an ALCM activity. This results in a 0.3 FTE difference between the number of FTEs we have assessed as efficient overall and the number of FTEs proposed by GAWB. As the impact of a 0.3 FTE change in the cost of staffing is not material, we find that GAWB's proposed manning levels and cost of staff are efficient.

Since the issue of its Final Report, Jacobs has reviewed its analysis supporting its findings on operating costs, specifically with respect to GAWB's initial misallocation of staff between operations and ALCM. Following this

[11] GAWB has not provided in their submission or other supporting documents a breakdown of the proposed number of staff in each area.

review we confirm that this misallocation i.e. the initially incorrectly classified resource in the information provided to us by GAWB was taken into consideration by us in developing our recommendation on staffing levels and costs for operations. Our determination on the efficient level is based on our in house data on typical staffing levels for similar utilities, staffing benchmarks to which we have access (both public domain and via Jacobs' international business activities, and on knowledge of our staff, many of whom have previously held roles in water utilities. Our analysis therefor is undertaken on a fundamentally 'bottom up' basis and is to some extent, agnostic of the number of staff proposed by the utility – although we do analyse trends and reasons behind such. So, the fact that there was an initial staff misallocation, does not impact on our analysis. For example if more than one staff had been misallocated, bringing GAWB's stated required level to, say 30, we would still have determined, through the process described above, that the efficient number of staff, in our opinion, is 23.54. As such we confirm that, in our opinion, the efficient staffing level for operations is 23.54 which is consistent with Jacobs budget presented in both its Final Report and this revision to its Final report.

The Jacobs recommended total staff costs forecast for 2016 to 2020 for Operations are shown in Table I.8.

Table I.8: Jacobs' determined efficient operations staff opex

Operations Staff	2015	2016	2017	2018	2019	2020
Total Employment Cost ($'000)	2,568	2,652	2,745	2,842	2,950	3,062
Employment cost escalation		3.3%	3.5%	3.5%	3.8%	3.8%
Total other staff cost ($'000)	295	302	310	318	326	334
Total Operations staff cost ($'000)	2,863	2,955	3,055	3,159	3,275	3,395

The recommended forecast staff opex for Operations reflects our recommended escalation rates.

I.9 Extrapolation to other projects

The recommendation and findings of the assessment of Operations staffing expenditure may be extrapolated to other costs items as this activity is a core business expenditure item which GAWB actively manages.

I.10 Summary, conclusion and recommendation

The expenditure on operations staffing expenditure is assessed as prudent. This expenditure is a necessary and core business cost activity of the GAWB bulk water supply business. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.

We assess the expenditure as efficient. Operations FTEs have increased from just below 16 FTEs in 2010 to 23.5 FTEs in 2014. Based on our assessment of the added responsibility for operating the WTPs on a 24 hour seven days a week basis and the implementation of the DWQMP, we are of the opinion that an additional 7.2 FTEs from the 2010 level is justified. This includes an additional hatchery technician. The difference between our assessment of the number of efficient FTEs and that proposed by GAWB is not material.

As GAWB gains experience and knowledge of their network assets and their condition and as automation, SCADA and remote operations communications are improved; we consider that efficiencies will start to be realised leading to further lowering of costs for some Operations activities towards the later part of the next regulatory period.

I.10.1 Summary

Table I.9 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table I.9: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Operations - Staff	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to supply the proper quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.
	Efficiency		Operations FTEs have increased from under 16 FTEs in 2010 to 23. 5 FTEs in 2014. We are of the opinion that an additional 7.2 FTEs from the 2010 level is justified for Operations based on the additional responsibilities and obligations of the organisation. This is due to the implementation of the DWQMP as well as the requirement for 24 hours 7 days operation at the WTPs. The difference between the FTEs we consider efficient and the FTEs proposed by GAWB - being 0.3 FTE - is not material.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

I.10.2 Recommendations

We recommend the adoption of the Operations - Staff expenditure shown in Table I.10.

Table I.10: Jacobs' determined efficient operations staff opex

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Determined Efficient Operations Staff Expenditure	2,955	3,055	3,159	3,275	3,395

Appendix J. Opex – staff costs, ALCM

J.1 Executive summary

Table J.1 presents an overview of the findings of the prudency and efficiency of the expenditure item Staff Costs, ALCM which we find to be prudent but not efficient.

Table J.1: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Maintenance	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to properly maintain its infrastructure and supply the quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.
	Efficiency		ALCM FTEs have increased from 19 FTEs in 2010 to 35.5 FTEs in 2015. We are of the opinion that an additional 15.5 FTEs from the 2010 level is justified for ALCM based on the additional responsibilities and obligations of the organisation. We recommend a resolution of the misclassification of a water treatment plant operator position.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

J.2 Overview of opex

Table J.2 provides the actual Staffing expenditure for ALCM (in real 2015 $) between 2010 and 2015. The costs are based on data provided in GAWB's submission *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority, Appendices Volume One*, Appendix F which contains the report provided to GAWB by its consultant, GHD.

Table J.2: ALCM – Actual staffing opex[12]

Real $2015	2011	2012	2013	2014	2015
Staffing cost – ALCM ($'000)	2,509	2,804	3,087	3,153	3,472
Annual increase		11.8%	10.1%	2.1%	10.1%
QCA 2010 allowed ALCM staff cost ($'000)	1,887	1,873	1,925	1,971	2,021

ALCM staffing cost rose by a total of 38% over the current regulatory period from $2.5 million in 2011 to $3.5 million in 2015. This is at an average compounded annual rate of 8.5% p.a. The expenditure is also significantly in excess of the level of expenditure allowed by the QCA in its 2010 price investigation. Over the whole period, GAWB spent over $5.3 million more than that allowed by the QCA in staffing costs for ALCM.

In 2013/14, GAWB employed a total of 89 individuals allocated to six business units. The Executive Business Unit is headed by the Chief Executive Office and comprises of 4 employees including the CEO. The Commercial Business Unit is led by the Chief Financial Officer with a supporting staff of 9 and Human Resources Manager leads a small team of two other staff. The Corporate Services Business Unit is managed by the Corporate

[12] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, Appendix C

Services Manager with a total staff of 22 including three Hatchery Technicians and a Fisheries Manager. The largest business unit is Water Supply Services - Operations & Maintenance with a total of 35 staff led by the O&M Manager. Water Supply Services - Infrastructure Planning & Delivery is the final business unit with 14 positions, one of which is occupied by two individuals. The unit is headed by the Infrastructure Delivery Manager.

Total staff cost for GAWB in 2015 is budgeted by GAWB to amount to $9.9 million. GAWB's allocation of staffing costs to ALCM amounts to $3.5 million.

Table J.3 shows the proposed cost of staff cost within the 2015 to 2020 ALCM budget.

Table J.3: ALCM – Staffing proposed opex (nominal $'000)

Source	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
GAWB, *2015 Price Monitoring Investigation Submission to the Queensland Competition Authority*, September 2014, Table 17, page 22	3,970	4,093	4,229	4,377	4546
GHD, Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review, Appendix C	3,576	3,599	3,630	3,669	3,721

The staff costs forecast from GAWB's consultant's report[13] are in real FY2015$ terms. The staff costs forecast submitted by GAWB in its submission to the QCA are in nominal $ terms. After adjusting for an assumed 2.5% inflation rate (change in CPI), we note that the cost forecasts from GAWB's submission is greater (by over $300,000 p.a. over the five years) than that provided by GAWB's consultant. Our analysis below is based on GAWB's submission, therefore, rather than on GAWB's consultant's figures.

It is also noted that these expenditure items specifically exclude Curtis Island related expenditure which is the subject of a separate confidential submission to the QCA.

J.3 Documentation reviewed

The key reference documents used for this review are:

- GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, September 2014
- GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
- 2.a FTE reconciliation.xlsx
- 2.c Mvmt in FTEs.xlsx
- 3. TEC Split.xlsx
- O5.1 Operations staffing summary - includes historical costs and forecast.pdf
- O1.4 ALCM TEC forecast detail.xlsx
- Copy of EDOCS_n283839_v1_FTE_info_QCA_opex_by_year_xlsx.xlsx
- Copy of FY14 labour actual functional split.xlsx
- O8.2.1 Mercer market movements letter.pdf

[13] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014

- O8.7 GAWB Recruitment process.pdf
- O8.9.2 Fitters and Electricians.pdf
- O8.9.6 Extract from edocs 223583 Restructure of OM Specialist role appointment of OM Manager.pdf

J.4 Prudency

The employment of competent staff to operate its infrastructure is a core function for GAWB. The employment of capable personnel is necessary to ensure that GAWB is able to properly maintain its infrastructure and supply the proper quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. We therefore find that this expenditure to be prudent.

J.5 Efficiency

In this section we determine if the expenditure is efficient or not efficient.

J.5.1 Calculation of costs

Staff costs are allocated to ALCM on the basis of the total employment cost of a position and an estimate of the amount of time spent by staff attending to each of the four core functions identified by GAWB for its business. The four core functions are Asset Life Cycle Management, Operations, Strategy and Asset Creation and Corporate Services. Staff costs allocated to ALCM is thus the total employment cost (including wages, overtime, superannuation, leave and other on-costs) multiplied by the percent of time estimated to be spent on maintenance issues. GAWB estimated the total staff costs for the base year of 2015 and escalated the total costs by its proposed annual escalation factors. The GAWB forecast for staff has been developed on the basis that no additional staff is required over the next regulatory period. With the in-sourcing of maintenance, GAWB had significantly increased its staffing capabilities over the current regulatory period. Between 2011 and 2015, the number of FTEs employed by GAWB increased from 55.35 at the start of the current regulatory period based on the 2010 QCA approved budget to 86.5 FTEs currently employed by GAWB. GAWB expressed the view that this level of staffing is sufficient for the business and it would not be seeking to further increase its staffing levels over the 2016 to 2020 regulatory period.

Table J.4 and Table J.5 provides the breakdown of the expected ALCM staff cost. Total employment cost is escalated by GAWB's proposed annual escalation rates while other staff costs is escalated by expected CPI of 2.5% p.a. The forecast is based on ALCM employing a staff of 35.5 FTEs.

GAWB's projected annual escalation rate for total employment cost is based on advice from Mercer Consulting Pty Ltd. Data from Mercer is based on its remuneration database for 2013 which contains in excess of 220,000 records representing the remuneration for an incumbent in a specific position. Projections for cost increases in the next regulatory period are based on Mercer's experience in conjunction with official economic indicators including considerations of:

- Increasing cost of living
- Increase superannuation guarantee
- Increasing pressure on productivity levels and
- Penetration of short term incentives.

Table J.4: ALCM – Total Employment Cost Base Year

Employment Cost	2015 ($'000)
Salaries & Member's Fees & Overtime	3,378
ADO/higher duties	4
Capitalised Wages & On Cost Clearing	-875

Employment Cost	2015 ($'000)
Leave - Annual	309
Leave - Long Service	77
Payroll Tax	186
Superannuation - Guarantee	334
Work Cover	58
Total Employment Cost	3,472

Table J.5: ALCM – Other Staff Cost Base Year (nominal $)

Other Staff Cost	2015	2016	2017	2018	2019	2020
FBT	$22,138	$22,665	$23,235	$23,818	$24,415	$25,025
Staff Training	$111,053	$113,619	$116,487	$119,411	$122,402	$125,463
Conferences	$5,226	$5,347	$5,482	$5,619	$5,760	$5,904
Labour hire	$55,000	$56,375	$57,784	$59,229	$60,710	$62,227
Relocation expenses	$13,415	$13,725	$14,072	$14,425	$14,786	$15,156
Recruitment	$26,564	$27,178	$27,864	$28,563	$29,278	$30,011
Rent Paid	$42,119	$43,172	$44,251	$45,358	$46,491	$47,654
Staff Uniforms	$14,807	$15,149	$15,532	$15,921	$16,320	$16,729
Staff Welfare	$7,018	$7,180	$7,361	$7,546	$7,735	$7,928
Total other staff cost	$297,340	$304,410	$312,068	$319,890	$327,897	$336,097
Total Employment Cost	$3,471,602	$3,665,658	$3,780,816	$3,908,682	$4,049,536	$4,209,926
Total staff cost	$3,768,942	$3,970,068	$4,092,884	$4,228,572	$4,377,433	$4,546,023

Whilst the results of the above calculations based on data GAWB provided in response to our request is consistent with their submission, we note that the escalation rate that has been applied between 2015 and 2016 is somewhat different from GAWB's stated escalation rate in their submission.

J.5.2 Delivery of service

GAWB has progressively assumed full maintenance responsibilities for its assets during the course of the past four years. Prior to 2010, GAWB outsourced the majority of maintenance functions to external contractors and had limited asset condition information on its operational assets. In 2010, maintenance activity was progressively brought in-house and GAWB has significantly increased its internal capabilities and capacity to deliver maintenance for its own assets (with, for example, maintenance staff numbers increasing from 7.8 to 16.3 FTEs). As a result GAWB has better knowledge of its assets through implementing appropriate asset management practices. Key initiatives implemented were:

- In-sourcing of electrical and mechanical maintenance crews (March 2010)
- In-sourcing of easement maintenance activities (September 2011)
- Implementation of GAWB's Asset Management System (June 2013)

A major benefit of the in-sourcing of maintenance is greater asset information capture and assessment. This information has allowed GAWB to develop budgets and its capital renewal program more effectively. Previous forecasts for maintenance activities were based on desktop analysis with the work being outsourced. While the insourcing of the maintenance functions has resulted in cost increases, GAWB's development of asset management capability and planning has resulted in a more rational approach to maintenance through better knowledge of assets and forecasting of costs than was previously the case. While, the anticipated reduction in reactive maintenance and capital asset replacement expenditure resulting from this increase in operational and

reliability centred asset maintenance expenditure has not eventuated, GAWB expects that the increase in preventative maintenance and better knowledge of the system will lead to reduced reactive maintenance costs and deferred refurbishment/replacement expenditure.

Over the current regulatory period, GAWB has steadily increased its staffing numbers in ALCM. The total number of FTEs over this current regulatory period is shown in Table J.6.

Table J.6: ALCM FTEs

	2010	2011	2012	2013	2014	2015
ALCM FTEs	19.06	27.80	30.90	33.30	35.46	35.46

The increase in FTE is due to the need to employ sufficient resources to meet the planned maintenance requirements of the business's assets. As a result, a total of 9 fitters and electricians were recruited over the current regulatory period. In addition, two additional rangers were employed in 2012 to undertake land and easement maintenance. The only part of maintenance not undertaken by in house GAWB employed staff is the engagement of Aestec Services to be on call to perform emergency response services in the event of a pipeline failure on the mainland and McCosker Contracting to perform a similar service on Curtis Island.

J.5.3 Market conditions

The use of staff for all its maintenance needs means that GAWB has to meet the market for staff wages and benefits. To ensure that GAWB is consistent with market trends, GAWB utilises a report from Mercer Consulting (Australia) Pty Ltd, a remuneration specialist to ensure consistency with market movements in wages and salaries. Mercer's Quarterly Salary Review provides analysis of national remuneration trends, providing remuneration data (including wages, incentive payments and benefits) on over 300 positions in the Australian context. The Mercer Total Remuneration Survey reports covers 1,500 positions in Australia based on job descriptions and Mercer's point based position evaluation methodology. All positions in GAWB are covered with position descriptions which can be matched to positions included in the Mercer report. Scores based on the position description are developed which are then translated into wage grades that are set based on the appropriate categories in the Mercer report. Salary ranges are set consistent with the report from Mercer while individual salary adjustments are determined based on performance.

Mercer also provides their forecast for wages growth over the next 5 year period on which GAWB has based its proposed annual wage escalators.

J.5.4 Efficiencies and economies of scale

GAWB has identified potential efficiencies for staffing costs in the later part of the next regulatory period.

In addition, GAWB has indicated that it expects to achieve improved efficiencies through the implementation of a comprehensive asset management system that will enable it to better manage its asset processes by combining data from its financial system with data from its operations. GAWB expects to achieve efficiency savings of up to $330,000 by 2019/20.

J.5.5 Benchmarking

The use of the Mercer report ensures that GAWB's salaries are consistent with the market. In addition, as part of its submission, GAWB provided a report[14] by Marchment Hill Consulting (MHC) who was engaged by GAWB to conduct an independent Operational Benchmarking Study to provide view of GAWB's Opex efficiency relative to a set of comparable peer organisations in the Australian water sector focusing on operational expenditure. Two of the metrics used by Marchment Hill provided comparisons of the number of FTEs employed per unit of water sourced and number of FTEs per unit of mains length. In both these benchmarks Marchment Hill reported that GAWB performed better than its industry peer group ratio average.

[14] Marchment Hill Consulting, *Gladstone Area Water Board, Operational Benchmarking*, 11 July 2014

Given that staff costs form an integral part of operating expenses of all water utilities and that Marchment Hill Consulting is a respected consultant in the water industry we are of the opinion that GAWB's staff expenditure are within industry norms.

J.6 Trade-offs with capex

As greater knowledge of its network and infrastructure develops as a consequence of the insourcing of maintenance activities and as it continues the implementation of more preventative maintenance would lower the need for reactive maintenance. GAWB has proposed the refurbishment of the two pump stations at Gladstone WTP which deliver water to the GAWB potable water network and Gladstone Regional Council reticulation systems. The pumps' current switchboards and motor controls are ageing and recently the peak power demand exceeded the nominal rating of the power supply transformers. The refurbishment which will address the risks to delivery posed by ageing assets and managing risks to the electrical supply would also reduce maintenance costs for the pump stations.

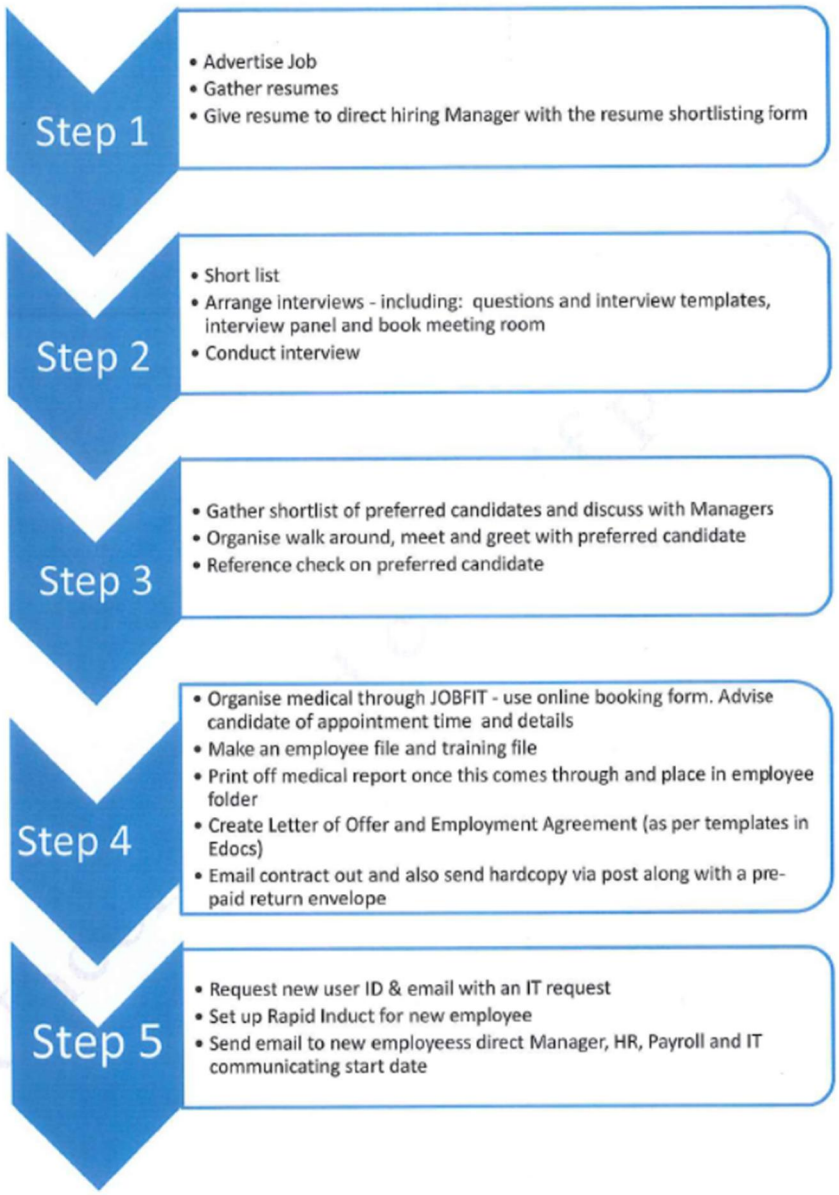
However, a number of these proposed capital projects will allow GAWB to carry out more maintenance work. These include:

- The ADPS. ADPS is a critical asset in GAWB's water delivery network and crucial to pumping water from Awoonga Dam. In order to replenish delivery network storage it is necessary to pump water from Awoonga Dam every 24 hours. Consequently, maintenance can only be performed on ADPS and the infrastructure connecting it to Awoonga Dam in constrained circumstances. GAWB is planning the construction of a storage dam within GAWB's delivery network, between Awoonga Dam and Toolooa Reservoir which would provide approximately 14 days' supply so that necessary comprehensive maintenance is able to be performed on ADPS.
- Essential maintenance is difficult to undertake from the inlet tower through the associated valves and pipeline to the pump station, and in the single pipeline under the spillway channel, due to the limited timeframe in which such assets must be dewatered. Maintenance work must be completed to enable the pump station to be returned to service within a 12 to 16 hour window. This limited timeframe creates substantial risk to the efficient completion of maintenance activities. These maintenance activities should be conducted at five-yearly intervals to accord with recommended asset management practice, but were undertaken for the first time during 2012 (30 years after installation) when GAWB was able to develop and execute an acceptable maintenance activity having regard to these constraints. These constraints resulted in substantial premium in the cost of these works of approximately $2 million and required long lead-time to affect the necessary planning and procurement.

J.7 Policies and procedures

Prior to the recruitment of staff, Board approval has to be sought to create additional staff positions. A Board paper has to be developed by the manager responsible and submitted by the CEO to the board for a decision. The paper has to detail the need, financial implications and risk faced by GAWB of creating or not creating the proposed position.

GAWB has follows a five step recruitment policy illustrated below.



While simple, we consider it to be an appropriate recruitment policy for a small organisation with clear steps from the beginning of the recruitment process to the induction of the recruit. For example, it covers the major issues of recruitment and includes the induction process for a new employee.

For remuneration, GAWB undertakes annual reviews of staff wages on the basis of being competitive with the market for they type of skills required and business location. Wage ranges for staff are based on the Mercer report based on appropriate position descriptions with individual increments based on individual performance.

J.8 Assessment of reported expenditure

In 2010, it was decided that GAWB would change their maintenance arrangements from one where most of the work was contracted to external parties to one where GAWB would internalise most maintenance activities. As a result, an additional nine FTE electricians and mechanical fitters were recruited. Additional rangers were also required for the increased land and easement maintenance activities that were previously undertaken by contractors. The proposed number of FTEs is shown in Table J.7.

Table J.7: Proposed ALCM FTEs

Area	2010	2013	Proposed
O&M manager and admin support	0.75	2.00	2.05
Business supporting services	2.92	3.90	3.90
Land management	2.55	2.80	3.55
Fitters, electricians & control tech	1.00	8.80	10.80
Maintenance supervision and planning	2.30	2.30	2.30
Technical support	5.54	7.50	6.87
Recreation & rangers	4.00	6.00	6.00
Total	19.06	33.30	35.47

In particular, GAWB has increased staff numbers in the following areas:

- Additional 1.3 FTEs to provide executive, co-ordination, administration and project support to the O&M Manager and business unit due to the in-sourcing of maintenance activities
- One additional FTE to provide business support services including payroll, procurement, contract and OHS services
- One additional senior land officer to provide support to the Land Manager
- Additional 0.8 FTE allocation for an automation and control technician (shared with Operations)
- Four FTE maintenance fitters and electricity due to the insourcing of mechanical and electricity maintenance activity previously undertaken by contractors. These maintenance fitters and electricity also provide in-house on-call arrangements for emergency maintenance and undertake inspections and maintenance work on network assets.
- Four additional maintenance staff to undertake preventative, backlog and breakdown maintenance activities.
- One apprentice fitter to provide long term capability and redundancy in maintenance services.
- Delivery of GAWB's capex and opex programme of works and to provide engineering and technical support and advice
- Easement and recreational area maintenance previously contracted out necessitated the employment of an additional two Rangers
- No change has been proposed for dam supervisor and maintenance planner/schedulers

The bulk of the additional staff for ALCM is due to the addition of nine mechanical fitters and electricians (including one apprentice). We accept that the in sourcing of maintenance activities necessitates the employment of sufficient mechanical fitters and electricians. GAWB has provided us with the Board paper to create four FTEs (two mechanical fitters and two electricians) when the in sourcing of maintenance activities was proposed. We are of the opinion that a permanent presence of four FTEs will be required to ensure that all planned maintenance activities are better targeted; appropriate data is being captured and entered into GAWB's asset management system for ongoing assessment and further development of the planned maintenance programmes. GAWB also requires it two mechanical fitters to have current restricted electrical license, enabling this crew to be more flexible in supporting the electricians and when carrying out mechanical work that may require the use of a restricted electrical licence (e.g. pump isolations in the field).

GAWB expects that its mechanical fitters and electricians will respond to and repair all mechanical and electrical faults both within the WTPs and the delivery network.

The employment of the fitters and electricians together with the electrical engineer and mechanical and electrical maintenance supervisor allows GAWB to establish an out of hours on-call roster that has a qualified

person on call. We also accept that it is good practice to employ an apprentice to train a resource that will be able to provide long term capability and redundancy in maintenance services.

GAWB has also budgeted to employ four maintenance staff to undertake preventative, backlog and breakdown maintenance activities in addition to the two mechanical fitters and two electricians. We have seen no Board papers for such a proposal although we acknowledge that additional staff will be needed to undertake maintenance work that was previously not able to be undertaken. We however see little distinction between preventative and breakdown maintenance activities used to justify the employment of the additional four maintenance staff from the work that the four mechanical fitters and electricians had been employed to undertake.

In response to Jacobs draft report GAWB has provided additional details. The additional information indicated that GAWB had proposed positions for a total of four electricians and four mechanical fitters. One position however has been misclassified as mechanical fitter when the position should be a water treatment plant operator. Information was also provided showing that its four electrician, three mechanical fitters, is utilised for a total of 9,250 hours in a year. This includes work to undertake corrective maintenance (5,400 hours), planned maintenance (2,700 hours), contractor supervision (560 hours) and administration and training (590 hours). With a total of 1,620 normal working hours per person per year (11,340 hours for the team of seven maintenance workers after taking into account leave, RDO, sick days and public holidays), a utilisation rate of over 80% is achieved. Jacobs accepts that utilisation above 80% is an efficient utilisation and that seeking to achieve a utilisation rate significantly above 80% is not appropriate.

We also accept that with the in sourcing of easement maintenance work, additional rangers will be required. Given the large area that GAWB is responsible for, an additional two rangers is in our view justified.

We note that GAWB has budgeted for an additional senior land officer to support the Land Manager. This brings to total number of land management officers to three, plus the Land Manager. This is, in our view, beyond what is required to undertake the activity. Other increases in FTEs are in the incidental support areas required due to the in-housing of maintenance activities.

Based on the ALCM total employment cost in 2015 of $3.5 million, the projected total staffing cost in ALCM increases this to $3.6 million including $296,000 in other staff costs. The total staff cost forecast for 2016 to 2020 for ALCM based on 33.5 FTEs are shown in Table J.8.

Table J.8A: Jacobs' determined efficient ALCM staff opex – initial view

	2015	2016	2017	2018	2019	2020
GAWB ALCM TEC base budget ($'000)	3,472					
FTE proposed	35.5					
Recommended FTE	34.5					
Recommended ALCM TEC budget ($'000)	3,374[15]	3,485	3,607	3,734	3,875	4,023
Escalation		3.3%	3.5%	3.5%	3.8%	3.8%
Other staff costs ($'000)	296	306	317	328	340	353
Total staff costs ($'000)	3,670	3,791	3,924	4,062	4,215	4,376

The recommended forecast staff opex for ALCM reflects also our recommended escalation rates. While the reduction in FTEs may result in a lowering of other staff costs like the cost of uniforms, welfare and training, any impact is immaterial. We thus recommend that the QCA accept the other staff cost proposed by GAWB. The difference between GAWB's costs and ours is $98,000 in 2015, which is approximately the cost of one operational staff member.

[15] $3,472/35.5*34.5=$3,347

The increasing difference in following years is a result of non-routine labour costs included by GAWB in 2016. GAWB provided further information on this matter which we have considered below, resulting in a minor change to the above recommended costs (presented further below if Table J.8B).

Revised Asset Life Cycle Management (ALCM) staff costs

GAWB has included in 2016, two labour cost items that do not appear in the base year (2015). This seems inconsistent with the following excerpt in GAWB's (2014) initial submission:

> "For each year of the 2016–2020 regulatory period operating expenditure forecast, GAWB has utilised the Base Year expenditure value escalated by the relevant escalation factor. For expenditure items that vary year-to-year from the Base Year due to their nature, GAWB has determined a specific forecast for that item. This is relevant for the maintenance, specialist support, consulting services, legal advice, pricing matters, professional engineering services, and Sponsorships and donations expenditure categories."

We note that of these non-routine cost categories, none are labour costs. That is, GAWB's initial submission indicated that there are no non-routine labour cost items in 2016 or beyond. In simple terms, based on its submission, GAWB should not be proposing non-routine labour related costs in 2016.

In 2015, the difference between Jacobs and GAWB is exactly described by the reduction of one FTE ($98,000). Over 2016-20, the difference widens as we had not included the 2016 labour costs for bonuses ($30,000) and a share of additional Curtis Island labour costs ($50,000). Due to our different approaches, the difference from GAWB's costs becomes $181,000.

We assume the bonus costs relate to performance, morale and staff retention. GAWB advise that additional Curtis Island labour costs relate to a portion of Curtis Island staff who do not solely perform Curtis Island activities (0.5 FTE). Together these two items explain why in 2016 the difference from GAWB steps up beyond a difference of opinion on labour cost escalation.

The question is: What do we consider in relation to the efficiency of the advised 2016 non-routine items? After reading the initial GAWB submission it was reasonable for us to determine the efficient number of FTE's required to deliver ALCM activities and escalate the base year only to establish efficient labour costs. However, in the light of this further information on non-routine labour costs, we now consider the following (noting our assessment of efficient FTE's remains unchanged as it was cognisant of the work needed):

1. For the bonus pool cost ($30,000) we consider that while this should have been in the 2014-15 costs provided for review, it is relatively standard practice to maintain staff morale and retain staff (to avoid recruiting and associated costs). On this basis we consider this cost ($30,000) to be efficient.
2. For the Curtis Island portion of labour costs ($50,000), which effectively reflects an additional 0.5 FTE, and noting that our view on the efficient FTE requirement has not changed and that this new information does not provide compelling grounds for change, we consider this proposed cost ($50,000) as not efficient.

The net effect of our consideration is that we will allow (in 2016) an increase of $30,000. This has been de-escalated from $30,000 in 2016 to $29,000 in 2015 using our 3.3% labour cost escalator for 2015-2016. The table (presented above) has been revised as follows.

Table J.9B: Jacobs' determined efficient ALCM staff opex – final view

	2015	2016	2017	2018	2019	2020
GAWB ALCM TEC base budget ($'000)	3,472					
FTE proposed	36					
Recommended FTE	35					
Initial Recommended ALCM TEC budget ($'000)	3,374	3,485	3,607	3,734	3,875	4,023
Additional allowance for bonus pool	29					

Revised Recommended ALCM TEC budget ($'000)	3,403	3,515	3,638	3,766	3,909	4,057
Escalation		3.30%	3.50%	3.50%	3.80%	3.80%
Other staff costs ($'000)	296	306	317	328	340	353
Initial Total staff costs ($'000)	3,670	3,791	3,924	4,062	4,215	4,376
Revised Total staff costs ($'000)	3,699	3,821	3,955	4,094	4,249	4,410
Difference in Total staff costs ($'000)	29	30	31	32	34	34

We note this is a relatively immaterial change, but recommend as efficient the highlighted revised staff costs.

J.9 Extrapolation to other projects

The recommendation and findings of the assessment of ALCM staffing expenditure may be extrapolated to other costs items as this activity is a core business expenditure item which GAWB actively manages.

J.10 Summary, conclusion and recommendation

The expenditure on ALCM staffing expenditure is assessed as prudent. This expenditure is a necessary and core business cost activity of the GAWB bulk water supply business. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function. We assess the expenditure as not efficient. ALCM FTEs have increased from 19 FTEs in 2010 to 35.5 FTEs in 2015. Based on our assessment of the added responsibility by the in sourcing of maintenance, we are of the opinion that an additional 14.5 FTEs from the 2010 level is justified. We thus recommend on opex based on 33.5 FTEs.

As GAWB gains experience and knowledge of their network assets and their condition, we expect that efficiencies will start to be realised leading to further lowering of costs for some ALCM activities towards the later part of the next regulatory period.

J.10.1 Summary

Table J.10 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table J.10: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
ALCM - Staff	Prudency		Core activity in the supply of bulk water. The employment of capable personnel is necessary to ensure that GAWB is able to properly maintain its infrastructure and supply the quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. Appropriate recruitment and remuneration policy and processes has been put in place to identify the need and secure the appropriate staff for the business function.
	Efficiency		ALCM FTEs have increased from 19 FTEs in 2010 to 35.5 FTEs in 2015. We are of the opinion that an additional 15.5 FTEs from the 2010 level is justified for ALCM based on the additional responsibilities and obligations of the organisation. We recommend a resolution of the misclassification of the water treatment plant operator position.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

J.10.2 Recommendations

We recommend the adoption of the ALCM - Staff expenditure shown in Table J.11.

Table J.11: Jacobs determined ALCM Staff opex

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Jacobs determined ALCM Staff Expenditure	3,791	3,924	4,062	4,215	4,376

Appendix K. Opex – maintenance, ALCM

K.1 Executive summary

Table K.1presents an overview of the findings of the prudency and efficiency of the expenditure item Maintenance, ALCM which we find to be both prudent and efficient.

Table K.1: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Maintenance	Prudency		Core activity in the supply of bulk water. Proper maintenance of assets, programmes and systems are required to meet customer expectations and the Drinking Water Quality Management Plan.
	Efficiency		Maintenance capabilities are being improved resulting in a better understanding of the maintenance requirements of the network. Efficiencies should start to be realised when asset conditions and maintenance requirements are fully known.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

K.2 Overview of opex

The focus of the ALCM function has evolved significantly since the QCA's 2010 Price Review. Prior to 2010, GAWB outsourced the majority of maintenance functions to external contractors and had limited asset condition information on its operational assets. During 2009, 2010 and 2011, maintenance activity was progressively brought in-house and GAWB has significantly increased its internal capabilities and capacity to deliver maintenance for its own assets. As a result GAWB now has better and improving knowledge of its assets through on-going asset condition reviews enabling it to, ultimately, implement appropriate asset management practices. Key initiatives implemented were:

- In-sourcing of electrical and mechanical maintenance crews (March 2010)
- In-sourcing of easement maintenance activities (September 2011)
- Implementation of GAWB's Asset Management System (June 2013)

A major benefit of the in-sourcing of maintenance is greater asset information capture and assessment. This information has allowed GAWB to develop budgets more effectively than was previously the case as well as its capital renewal program. Previous forecasts for maintenance activities were based on desktop analysis with the work being outsourced. While the insourcing of the maintenance functions has resulted in operational cost increases, GAWB's development of asset management capability and planning has resulted in a more rational approach to maintenance and asset replacement through better knowledge of assets and forecasting of costs. However, this has also resulted in significantly higher preventive maintenance costs than previously allowed. To date, the anticipated reduction in reactive maintenance and capital asset replacement expenditure resulting from this increase in operational and reliability centred asset maintenance expenditure has not eventuated.

With respect to preventive maintenance activities, GAWB has undertaken the preparation of Lifecycle Maintenance Plans (LCMPs) which we consider are in accordance with good asset management practices. The LCMPs are based on details, costs and frequencies of maintenance currently available, and GAWB expects to be able to review, improve and optimise over time as understanding of their asset base improves.

GAWB expects to be able to achieve the potential for future reductions in ALCM costs as asset management capability is developed, backlog of maintenance is reduced, knowledge of asset condition and reliability is

increased, improved reliability is achieved, the interface between Operations and ALCM functions is managed, and the land management activity backlog is reduced.

Table K.2 provides the actual maintenance expenditure between 2010 and 2015.

Table K.2: ALCM – Actual maintenance opex[16]

ALCM Maintenance costs	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	Average
Actual maintenance cost (real 2015$) ($'000)	1,891	2,435	1,592	2,704	2,174	2,160
Annual increase		28.8%	-34.6%	70.0%	-19.6%	

As tabulated in Table K.2, the actual maintenance expenditure exhibits a cyclical pattern. This is driven mainly by the timing of major overhauls of pumps and motors, the cyclical replacement of consumables like batteries and cyclical nature of inspections.

Further, the proposed maintenance expenditure is not directly comparable with the QCA's 2010 allowance for maintenance as that QCA allowance in 2010 includes an allowance for motor vehicles expenditure and staff costs which are in a separate category for the 2015 review. The 2015 maintenance category also includes fencing, fire management and weed and pest animal control which was not included in the 2010 assessment of maintenance costs.

Table K.3 shows the proposed cost of Maintenance within the 2015 to 2020 budget.

Table K.3: ALCM – Maintenance proposed opex ($'000)

Source	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
GAWB, 2015 Price Monitoring Investigation Submission to the Queensland Competition Authority, September 2014, Table 17, page 21	2,308	2,257	2,790	2,463	2,810
GHD, Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review, Appendix C	2,165	2,062	2,504	2,145	2,397

The maintenance costs forecast from GAWB's consultant's report[17] are in real FY2015$ terms. The maintenance costs forecast submitted by GAWB in its submission to the QCA is in nominal $ terms. After adjusting for an assumed 2.5% inflation rate (CPI), we note that the maintenance cost forecasts from GAWB's submission is greater (between $88,000 and $98,000 p.a. over the five years) than that provided by GAWB's consultant. Our analysis below is based on GAWB's submission, therefore, rather than on GAWB's consultant's figures.

It is also noted that these expenditure items specifically exclude Curtis Island related expenditure which is the subject of a separate confidential submission to the QCA.

[16] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review, Appendix C*

[17] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014

K.3 Documentation reviewed

The key reference documents used for this review are:

- GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, September 2014
- GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
- O2.1 Maintenance forecast detail 2015 – 2020.xls
- O2.2 GAWB LCMPs of multiple assets
- O2.13 Maintenance history of spend.pdf
- Marchment Hill Consulting, *Gladstone Area Water Board, Operational Benchmarking*, 11 July 2014

K.4 Prudency

The proper maintenance of assets is a core function for GAWB. Appropriate preventative and reactive maintenance of assets will ensure that GAWB is able to supply the proper quality and quantity of water required by its customers and in accordance with its Drinking Water Quality Management Plan. We therefore find this expenditure to be prudent.

K.5 Efficiency

In this section we determine if the expenditure is efficient or not efficient.

K.5.1 Calculation of costs

The forecast cost for preventive maintenance for the current period was calculated by GAWB from fixed maintenance schedules based on asset life, and historic costs. We understand that expenditure variations over the forecast period are the result of changes in preventive and periodic maintenance in accordance with the LCMP schedules and additional major maintenance items.

Over the forecast period, GAWB expects efficiencies to be achieved as and when a greater understanding of the requirements of the assets is obtained. This is expected to result in reduced frequencies of some preventive maintenance activities, and reduced unit costs of repeat activities over time as efficiencies are built into contract costs of new activities not previously carried out.

GAWB has allowed a maintenance contingency of $300,000 for each year of the forecast period. This contingency has been determined by the board, and requires CEO approval prior to accessing the funds. Historic amounts of unanticipated expenditure during the current period due to abnormal events (cyclones and discovery of asbestos at a major asset) beyond typical expectations for breakdown maintenance, were identified at around $452,000 per annum including possible insurance claims (not all of which was recoverable), and around $123,000 excluding possible insurance claims. We consider that the maintenance contingency of $300,000 p.a. for unanticipated events is reasonable as GAWB is transitioning from a position of poor asset knowledge to one in keeping with good utility practice.

A significant inclusion in the preventative maintenance schedule relates to pipeline condition assessments. GAWB has deferred capital expenditure to replace certain pipelines resulting in increased on-going pipeline condition assessment costs. In order to mitigate the risk of pipeline failure, GAWB expects to conduct additional pipeline condition monitoring, pipeline repairs, system operational monitoring and interaction with pressure control. Increased expenditure for pipeline condition assessments is planned for 2018–2020.

The expenditure forecast also includes an annual allowance for maintenance which will be required following a flood event that is not covered by insurance. This allowance is based upon the costs incurred in the currently regulatory period that could not be recovered from insurance resulting from a flooding event. Since the 2004–

2007 drought broke, GAWB has experienced generally wetter than average weather conditions. Awoonga Dam (at 40 metres) has spilled 7 times and is currently at over 90% capacity.

We have reviewed the LCMPs developed by GAWB for each of the following assets that impact on the forecast maintenance expenditure:

Awoonga Dam Pump Station

- Pump No 1 and 2 pump overhaul
- Pump No 3 pump overhaul
- Structure spillway pipe inspection

Awoonga Dam

- Storage structures annual dam inspection
- Intake towers baulk/screen maintenance

Compressors

- Periodic maintenance

Control systems

- SCADA
- Telemetry

Cranes

Dosing systems

Gladstone Water Treatment Plant

- Treatment circuit No 1
- Filters
- Recovery system
- DAF

Pipeline MSCL piping

Pump station pump/motor overhaul

- Benaraby
- Boat Creek
- Calliope
- Glen Eden
- High Lift
- Low Lift

The details contained in the LCMPs are comprehensive and provide a description of the assets and its role in GAWB's operations, its operational usage and life expectancy, a history of the assets and their existing capabilities and requirements. The LCMP also provides details for factors that limit a given asset's usage or its current condition and thus provides the justification for the work to be carried out and the timeframe over which this work is required. Key risks of the asset in its current condition poses are also provided in the LCMPs. The

maintenance programme is discussed in the LCMP together with its funding requirements over the next regulatory period (and beyond).

Other GAWB maintenance cost forecasts (without a supporting LCMP) include some ongoing maintenance, repairs and inspection activities.

Table K.4 provides a summary forecast for maintenance expenditure each asset system over the 2015/16 – 2019/20 period.

Table K.4: ALCM – Maintenance Expenditure Forecast

Asset System	2015/16	2016/17	2017/18	2018/19	2019/20
Awoonga Dam Pump Station	$83,121	$238,591	$141,174	$111,589	$399,493
Awoonga Dam	$59,733	$66,479	$82,787	$69,845	$65,934
Compressors	$23,893	$23,203	$30,107	$24,378	$26,374
Control Systems	$68,675	$70,392	$72,152	$73,955	$75,804
Cranes	$18,952	$19,425	$19,911	$20,409	$20,919
Dosing Systems	$7,688	$23,639	$8,077	$24,836	$8,486
Gladstone Water Treatment Plant	$5,125	$36,772	$32,307	$5,519	$5,657
Pipeline 'pigging'	$-	$-	$430,756	$441,525	$452,563
Pump Station	$35,875	$57,784	$37,691	$82,786	$39,599
Reservoir Maintenance	$235,750	$157,594	$355,374	$176,610	$260,224
Yarwun Water Treatment Plant	$313,062	$242,091	$328,910	$254,347	$345,561
Pipeline failure/repairs	$128,125	$131,328	$134,611	$137,977	$141,426
Recreation Area & Easement Machinery Maintenance	$111,961	$114,760	$117,629	$120,569	$123,584
On Call Service Providers - Pipeline Repairs	$59,487	$60,974	$62,498	$64,061	$65,662
General Mechanical and Electrical Corrective Maintenance on Dosing Systems	$49,969	$51,218	$52,498	$53,811	$55,156
Repairs and Inspections	$105,376	$19,823	$67,729	$20,827	$21,347
Corrective Maintenance	$34,715	$35,583	$95,578	$37,384	$33,942
South Trees Assessment Stage 2	$307,500	$-	$-	$-	$-
Additional maintenance items	$658,877	$907,537	$720,232	$742,653	$668,444
Total[18]	$2,307,882	$2,257,194	$2,790,022	$2,463,081	$2,810,177

Detailed forecast of maintenance expenditure may be found in Table K.8.

K.5.2 Delivery of service

GAWB has progressively assumed full maintenance responsibilities for its assets during the course of the past four years. Prior to 2010, GAWB outsourced the majority of maintenance functions to external contractors and had limited asset condition information on its operational assets. In 2010, maintenance activity was progressively brought in-house and GAWB has significantly increased its internal capabilities and capacity to deliver maintenance for its own assets (with, for example, maintenance staff numbers increasing from 7.8 to 16.3 FTEs). As a result GAWB has better knowledge of its assets through implementing appropriate asset management practices. Key initiatives implemented were:

[18] Totals may not add due to rounding

- In-sourcing of electrical and mechanical maintenance crews (March 2010)
- In-sourcing of easement maintenance activities (September 2011)
- Implementation of GAWB's Asset Management System (June 2013)

A major benefit of the in-sourcing of maintenance is greater asset information capture and assessment. This information has allowed GAWB to develop budgets and its capital renewal program more effectively. Previous forecasts for maintenance activities were based on desktop analysis with the work being outsourced. While the insourcing of the maintenance functions has resulted in cost increases, GAWB's development of asset management capability and planning has resulted in a more rational approach to maintenance through better knowledge of assets and forecasting of costs than was previously the case. While, the anticipated reduction in reactive maintenance and capital asset replacement expenditure resulting from this increase in operational and reliability centred asset maintenance expenditure has not eventuated, GAWB expects that the increase in preventative maintenance and better knowledge of the system will lead to reduced reactive maintenance costs and deferred refurbishment/replacement expenditure.

GAWB does not presently separately record preventative and reactive maintenance expenditure and as such, we are not able to benchmark this metric. We recommendation that a distinction between preventative maintenance and reactive maintenance costs be made in GAWB's recording system to capture this data for future expenditure. This will capture the trends of each type of maintenance expenditure and allow an analysis of how their ratios change over time.

K.5.3 Market conditions

GAWB's in-sourcing of maintenance activities proved to be beneficial during the peak external contractor demand period that was experienced in connection with the development of the liquefied natural gas plants on Curtis Island. Had maintenance capabilities not existed in-house, GAWB's continuity and reliability of supply may have been jeopardised through long contractor response times. We do note that this market situation is unlikely to re-occur during the 2015-20 period and as such, in house maintenance is unlikely to provide a similar benefit during the next regulatory period.

K.5.4 Efficiencies and economies of scale

The forecast cost for preventive maintenance for the current period was calculated from fixed maintenance schedules based on asset life, and historic costs (i.e. zero based or bottom up budgeting was employed by GAWB). For the last year of the current period (2015) and the forecast period, preventive maintenance schedules and non-staff costs have been determined through the preparation of LCMPs for each major facility and asset or asset class.

An LCMP summarises asset details, current and future levels of service, utilisation, condition, major overhaul or repair events and key asset risks. Life cycle strategies include acquisition, operation, maintenance and disposal. 10-year estimates are developed by GAWB for both operating and capital expenditure. Operating expenditure includes regular external inspection and well as cyclic overhauls. In addition, the maintenance expenditure includes breakdown and corrective maintenance and repairs. These costs are based on average historic costs or estimates for breakdown maintenance.

The forecast planned and LCMP derived preventive maintenance component of maintenance expenditure typically comprises about 70% of forecast maintenance expenditure. The remainder of the maintenance expenditure (approximately 30%) includes estimates of breakdown, to repair pipelines and corrective maintenance based on average historic costs.

GAWB anticipates that the overall level of maintenance expenditure, particularly reactive, will decline over the long term as maintenance schedules and unit costs are refined over time and we agree with this assumption. Given the relatively recent in-sourcing of maintenance responsibility, and the build-up of GAWB's capabilities in this area over the most of the current regulatory period, we expect that the efficiencies flagged by GAWB in its Strategic Water Plan (November 2013) will only be realised in the later part of the next regulatory period. We however expect that such efficiencies will be clear in the following regulatory period (2020 onwards) although

some improvements (in the order of $100,000 to $220,000) may be seen from 2018 onward during the next regulatory period. This potential efficiency has not been included in out recommended expenditure given the uncertainty over its timing and value.

K.5.5 Benchmarking

As part of its submission, GAWB provided a report[19] by Marchment Hill Consulting (MHC) who was engaged by GAWB to conduct an independent Operational Benchmarking Study to provide view of GAWB's opex efficiency relative to a set of comparable peer organisations in the Australian water sector focusing on operational expenditure. MHC found that GAWB's efficiency ratios are consistently superior to the peer group. In terms of the operating efficiency ratios, GAWB ranked best among its peers and compares favourably to the larger bulk supply entities in the peer group. GAWB's operating efficiency is also consistently superior to the other small regional integrated and bulk water entities. Having reviewed the MHC report, we see no reason to disagree with their conclusion that GAWB is operating within industry norms and may in fact be at the forefront of costs among its peers.

Given that maintenance activities form an integral part of operating expenses of all water utilities and that MHC is a respected and reputable consultant in the water industry and that, from our review of MHC's report, we concur with MHC's conclusions, we are of the opinion that GAWB's maintenance expenditure are within reasonable bounds.

K.6 Trade-offs with capex

At present, GAWB has not achieved a full understanding of the condition of all its assets. A better assessment of capex trade-offs should be achieved when the condition of all its assets and their maintenance requirements is achieved known by GAWB. However, some potential trade-offs have been identified in the LCMPs including:

- The development of the 300 ML offline storage lake planned to be constructed by 2017 may alleviate the operational demands and thus maintenance requirements on the pumps at Awoonga Dam Pump Station
- The Awoonga Dam pump station building structure has suffered from extensive corrosion and is currently undergoing refurbishment, thereby reducing reactive maintenance costs. However, periodic refurbishment/paint activities will be required throughout the life of the station
- Communications and control systems where components are no longer supported or where support will cease have been identified. Such systems will need to be replaced when maintenance is no longer possible or has become prohibitively expensive
- GAWB has identified that the section of piping from Benaraby Booster Pump Station to Golegumma Reservoir is old and may require remedial work
- The Queensland Department of Transport and Main Roads has identified and notified GAWB that the sections of AC pipe that span the Calliope River and Anabranch River bridges (approximately 200 m in total) needs to be replaced due to the deteriorating external condition of the piping
- Pumps and motors require an overhaul every 10 years. Replacement decision is based upon condition are to be made at the appropriate time

K.7 Policies and procedures

The maintenance requirements of a number of its major asset have led to the development of LCMPs. The LCMPs describes the maintenance activities and the drivers and reasons for annual variations. While LCMPs for GAWB's major assets are well developed since GAWB assumed direct responsibility for carrying out its maintenance, this process is still continuing and many other assets including the assets at the Yarwun Water Treatment Plant either do not have existing LCMPs (or were not provided to us for review). Similarly, the maintenance of a number of assets, systems or programmes do not have LCMPs developed because they are

[19] Marchment Hill Consulting, *Gladstone Area Water Board, Operational Benchmarking*, 11 July 2014

either unique and do not relate to a specific asset type or cover a range of assets and were identified after the LCMPs were developed. These include:

- Fire systems
- Condition monitoring programme
- Pest control
- Air conditioner servicing
- Flowmeter servicing
- Turbidity meter calibrations
- Inspection and calibration of control/level elements
- Fire and rescue alarm management
- Earthquake alarms
- Calibration of instruments

We recommend that a formal schedule and policy for the maintenance of these items not warranting a separate LCMP be developed as GAWB improves its in-house maintenance capabilities. Taking into account the above, we consider that GAWB's maintenance policy and procedure is still in a development phase as a result of taking over the direct maintenance of its assets in 2010 and should be completed within this next regulatory period. The development of LCMPs is in keeping with good practice and the same or similar practice should be extended to all maintenance activities. We also recommend that preventative and reactive maintenance costs be separately recorded to allow trending of both and their ratio to be captured and analysed.

K.8 Assessment of reported expenditure

The proposed expenditure for maintenance averages around $2.5 million p.a., varying between a high of $2.8 million in the last year (2020) and a low of $2.3 million in the first two years (2016 and 2017) of the regulatory period. In real 2015 $ terms, the peak expenditure of $2.6 million occurs in 2018 assuming a 2.5% inflation rate (CPI). Reasons for the variations to the maintenance cost of various assets have been provided to us by GAWB and largely relate to the need to undertake major overhauls of pumps and motors, cyclical replacement of consumables like batteries and cyclical nature of inspections.

We are of the opinion that the forecasts costs are not excessive and, with the exception of the early years of the internalisation of maintenance, the forecast costs are in keeping with the level of actual historical maintenance cost between 2010 and 2015. The low actual expenditure of 2010/11 and 2012/13 occurs as GAWB ramps up its maintenance activities and such a pattern is in keeping with building up of GAWB's maintenance capabilities. We also note that GAWB's maintenance costs have been benchmarked by MHC and, from our review, of MHC's report, we see no reason to disagree with their conclusion that costs are in keeping with industry norms.

We do note however that GAWB has applied a 2.5% inflation rate to their base 2015 costs. In our review of costs escalators, we have found that it is more appropriate to apply a 2.6% escalator to maintenance costs. We thus recommend an increase to GAWB's proposed maintenance expenditure between 2016/17 and 2019/20 to reflect this higher escalation of costs and, as such, Table K.5 below tabulates our recommended opex for maintenance.

Table K.5: Recommended Maintenance expenditure

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Recommended Maintenance Expenditure	2,308	2,259	2,795	2,470	2,821

K.9 Extrapolation to other projects

The recommendation and findings of the assessment of maintenance expenditure may be extrapolated to other costs items as this activity is a core business expenditure item which GAWB actively monitors.

K.10 Summary, conclusion and recommendation

The expenditure on maintenance expenditure is assessed as prudent. This expenditure is a primary cost activity of the GAWB bulk water supply business. Appropriate decision making process is being put in place to document management and maintenance of assets through the asset's life cycle but this process should be extended to other maintenance activities that are currently not as well documented.

We assess the expenditure as efficient. Costs have been based on historical expenditure and variations are due to the need to undertake maintenance on a cyclically basis. As GAWB gains experience and knowledge of their network assets and their condition, we expect that efficiencies will start to be realised leading to the lowering of costs for some maintenance activities.

K.10.1 Summary

Table K.6 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table K.6: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Maintenance	Prudency		Core activity in the supply of bulk water. Proper maintenance of assets, programmes and systems are required to meet customer expectations and the Drinking Water Quality Management Plan.
	Efficiency		Maintenance capabilities are being improved resulting in a better understanding of the maintenance requirements of the network. Efficiencies should start to be realised when asset conditions and maintenance requirements are fully known.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

K.10.2 Recommendations

We recommend the adoption of the maintenance expenditure shown in Table K.7.

Table K.7: Jacobs determined maintenance opex

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Jacobs determined Maintenance Expenditure	2,308	2,259	2,795	2,470	2,821

Table K.8: Detailed Maintenance Expenditure Forecast Proposed by GAWB

Asset System	Activity	2015/16	2016/17	2017/18	2018/19	2019/20
Awoonga Dam Pump Station						
Pump No 1 & 2	Pump overhaul	$-	$-	$-	$-	$214,968
	Motor overhaul	$-	$-	$-	$-	$92,775
	VFD Inspection	$30,750	$31,519	$32,307	$33,114	$33,942
	Cooling Water Pump Overhaul	$-	$-	$-	$-	$-
	Borescope Inspection	$10,250	$10,506	$10,769	$11,038	$11,314
	NDT Inspection	$-	$-	$53,845	$-	$-
Pump No 3	Pump overhaul	$-	$89,303	$-	$-	$-
	Motor overhaul	$-	$43,076	$-	$-	$-
	Borescope Inspection	$5,125	$5,253	$5,384	$5,519	$5,657
Structure	Spillway Pipe Inspection	$-	$21,013	$-	$22,076	$-
	Lift Inspections	$6,253	$6,409	$6,569	$6,733	$6,902
	Surge Vessel Inspection	$20,500	$21,013	$21,538	$22,076	$22,628
	Building - General maintenance	$5,125	$5,253	$5,384	$5,519	$5,657
	Inspect Dynaspheres	$2,542	$2,606	$2,671	$2,737	$2,806
	Service Fortress Locks	$2,577	$2,641	$2,707	$2,775	$2,844
Awoonga Dam						
Storage Structures	Annual Dam inspection	$16,810	$17,230	$-	$18,103	$18,555
	5yr Safety Inspection	$-	$-	$37,691	$-	$-
	Maintenance - V notch, piezometers, level sensors	$-	$21,013	$-	$22,076	$-
	Saddle Dam - miscellaneous maintenance	$15,375	$-	$16,153	$-	$16,971
	Fencing, handrails & signage	$10,250	$10,506	$10,769	$11,038	$11,314
Intake Towers	Baulk/screen maintenance	$10,250	$10,506	$10,769	$11,038	$11,314

Asset System	Activity	2015/16	2016/17	2017/18	2018/19	2019/20
	Sewerage Plant - waste disposal	$7,048	$7,224	$7,405	$7,590	$7,780
Compressors	Periodic Maintenance	$22,637	$23,203	$23,784	$24,378	$24,988
	Vessel External Inspection	$1,256	$-	$-	$-	$1,386
	Vessel Internal Inspection	$-	$-	$6,324	$-	$-
Control Systems						
SCADA	Software Licence Fees	$22,550	$23,114	$23,692	$24,284	$24,891
	Schneider Support Contract	$10,250	$10,506	$10,769	$11,038	$11,314
Telemetry	RADTEL Support Contract	$35,875	$36,772	$37,691	$38,633	$39,599
Cranes	Periodic Maintenance	$18,952	$19,425	$19,911	$20,409	$20,919
Dosing Systems	Pump Replacement	$-	$21,013	$-	$22,076	$-
	Pump Servicing	$10,250	$10,506	$10,769	$11,038	$11,314
Gladstone Water Treatment Plant						
Treatment Circuit No 1	Concrete inspection	$-	$-	$5,384	$-	$-
Filters	Filter sump internal inspect	$-	$-	$21,538	$-	$-
Recovery System	Reservoir Internal Inspection & Clean	$-	$31,519	$-	$-	$-
DAF	Miscellaneous mechanical & electrical	$5,125	$5,253	$5,384	$5,519	$5,657
Pipeline 'pigging'						
MSCL Piping	Pig hire and analysis	$-	$-	$430,756	$441,525	$452,563
Pump Station						
Benaraby	Pump/motor overhaul	$5,125	$5,253	$5,384	$5,519	$5,657
Boat Creek	PW Pump/motor overhaul	$5,125	$5,253	$5,384	$5,519	$5,657
	RW Pump/motor overhaul	$5,125	$5,253	$5,384	$5,519	$5,657
Calliope	Pump/Motor Overhaul	$5,125	$5,253	$5,384	$27,595	$5,657
Glen Eden	Pump/motor overhaul	$5,125	$5,253	$5,384	$5,519	$5,657
High Lift	Pump/Motor Overhaul	$5,125	$5,253	$5,384	$27,595	$5,657

Asset System	Activity	2015/16	2016/17	2017/18	2018/19	2019/20
Low Lift	Pump/Motor Overhaul	$5,125	$26,266	$5,384	$5,519	$5,657
Reservoir Maintenance						
Boyne Island	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$-	$-	$21,538	$-	$-
East End	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$20,500	$-	$21,538	$-	$22,628
	Recirculating Pump overhaul	$-	$-	$-	$-	$-
Fitzsimmons St 16ML	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$-	$-	$-	$11,038	$-
Fitzsimmons St 50ML	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$-	$-	$21,538	$-	$-
Gladstone Clearwater	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$20,500	$-	$21,538	$-	$22,628
Golegumma	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$-	$-	$21,538	$-	$-
Mt Miller	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$-	$-	$21,538	$-	$-
South Gladstone	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$-	$-	$21,538	$-	$-
Toolooa	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$20,500	$-	$21,538	$-	$22,628
Yarwun Clearwater	External Inspections	$15,375	$15,759	$16,153	$16,557	$16,971
	Internal Inspections	$20,500	$-	$21,538	$-	$22,628
Yarwun Water Treatment Plant						
Recovery Systems	Lagoon de-sludge	$82,000	$-	$86,151	$-	$90,513

Asset System	Activity	2015/16	2016/17	2017/18	2018/19	2019/20
UPS	Battery Replacement	$-	$5,253	$-	$5,519	$-
Fire Systems		$17,827	$18,273	$18,730	$19,198	$19,678
	Condition Monitoring Program	$13,370	$13,704	$14,047	$14,398	$14,758
	Pest Control	$19,736	$20,229	$20,735	$21,253	$21,785
	Air Conditioner Servicing	$14,514	$14,877	$15,249	$15,630	$16,021
	Flowmeter Servicing	$51,660	$52,952	$54,275	$55,632	$57,023
	Turbidity Meter Calibrations	$7,380	$7,565	$7,754	$7,947	$8,146
	12M - Insp/Calibrate - Control/Level Elements	$11,111	$11,389	$11,673	$11,965	$12,264
	1Y - Alarm Management - QLD Fire & Rescue	$5,207	$5,337	$5,471	$5,607	$5,748
	1M - Service - Earthquake Alarms	$22,606	$23,171	$23,750	$24,344	$24,953
	1M - Instrumentation - Calibration	$67,650	$69,341	$71,075	$72,852	$74,673
Pipeline failure/repairs						
Pipeline - BCPS to EERES		$41,000	$42,025	$43,076	$44,153	$45,256
Pipeline - Glenlyon Rd to SGRES - 600mm		$15,375	$15,759	$16,153	$16,557	$16,971
Pipeline - SGRES to Toolooa - PW		$15,375	$15,759	$16,153	$16,557	$16,971
Pipeline - GGRES To Rec Area		$10,250	$10,506	$10,769	$11,038	$11,314
Pipeline - Toolooa Chl to BBPS		$15,375	$15,759	$16,153	$16,557	$16,971
Pipeline - Boyne Island		$30,750	$31,519	$32,307	$33,114	$33,942
Recreation Area & Easement Machinery Maintenance		$111,961	$114,760	$117,629	$120,569	$123,584
On Call Service Providers - Pipeline Repairs						
Aestec		$46,162	$47,316	$48,499	$49,711	$50,954
McCosker		$13,325	$13,658	$14,000	$14,350	$14,708
General Mechanical and Electrical Corrective		$49,969	$51,218	$52,498	$53,811	$55,156

Asset System	Activity	2015/16	2016/17	2017/18	2018/19	2019/20
Maintenance on Dosing Systems						
Repairs and Inspections	East End Reservoir - Structural Analysis	$55,286	$-	$-	$-	$-
	Painting of Baulk	$-	$-	$27,091	$-	$-
	Toolooa 50ML Reservoir - Structural Review	$30,750	$-	$-	$-	$-
	Boyne Island Reservoir - Structural Monitoring	$19,340	$19,823	$20,319	$20,827	$21,347
	GWTP - Concrete Repairs	$-	$-	$20,319	$-	$-
Corrective Maintenance						
	Minor corrective maintenance on pumps and motors	$19,340	$19,823	$20,319	$20,827	$16,971
	Toolooa 50ML Reservoir - Clean Out	$-	$-	$29,553	$-	$-
	Fitzsimmons Street 50ML Reservoir - Clean Out	$-	$-	$29,553	$-	$-
	Corrective maintenance on GWTP building and grounds	$15,375	$15,759	$16,153	$16,557	$16,971
South Trees Assessment Stage 2	Steel pipe painting 2000m by 2 pipes.	$307,500	$-	$-	$-	$-
Additional maintenance items:	Spillway pipe repairs	$-	$13,658	$-	$-	$-
	Painting	$-	$-	$83,997	$-	$-
	General concrete repairs	$-	$-	$-	$59,606	$-
	Spillway channel repairs	$-	$-	$-	$30,907	$-
	Head office maintenance - plumbers, electricians, etc.	$6,150	$6,304	$6,461	$6,623	$6,788
	Hatchery maintenance	$22,165	$22,719	$23,287	$23,869	$24,466
	ICT maintenance	$3,588	$3,677	$3,769	$3,863	$3,960
	Golegumma pipeline additional condition monitoring, pipe repairs, system operational monitoring and interaction with pressure control	$41,000	$42,025	$43,076	$44,153	$45,256

Asset System	Activity	2015/16	2016/17	2017/18	2018/19	2019/20
	East End pipeline additional condition monitoring, pipe repairs, system operational monitoring and interaction with pressure control	$41,000	$42,025	$43,076	$44,153	$45,256
	YWTP clarifier	$53,300	$273,163	$-	$-	$-
	Allowance for unplanned maintenance	$307,500	$315,188	$323,067	$331,144	$339,422
	Allowance for maintenance costs associated with a flood event	$95,332	$97,715	$100,158	$102,662	$105,229
	Fencing	$13,378	$13,713	$14,056	$14,407	$14,767
	Fire Management	$15,375	$15,759	$16,153	$16,557	$16,971
	Weed & Pest Management	$60,090	$61,592	$63,132	$64,710	$66,328
	TOTAL^	**$2,310,447**	**$2,265,069**	**$2,792,709**	**$2,471,352**	**$2,813,000**

^ Which includes an allocation of costs to Curtis Island that we understand will be stripped out in the QCA determination.

Appendix L. Opex – insurance, ALCM

L.1 Executive summary

Table L.1 presents an overview of the findings of the prudency and efficiency of GAWB's expenditure on insurance which we find to be both prudent and efficient.

Table L.1: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Insurance	Prudency		GAWB faces some risks of events occurring beyond its control which may result in losses that would threaten is business viability. Obtaining insurance for such events is prudent.
	Efficiency		The insurance contracts obtained by GAWB were market tested and were subject to the competitive quotation process. Whilst we find that GAWB's proposed insurance expenditure is efficient we recommend that the expenditure is reduced to reflect a lower escalation rate over the regulatory period.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

L.2 Overview of opex

GAWB purchases various types of insurance to cover different events and assets. Insurance coverage is obtained for:

- Group personal accident
- Multi-risk insurance
- Motor vehicles
- Industrial special risks
- Combined liability
- Marine hull

GAWB obtains professional insurance advice from Marsh Pty Ltd as its insurance broker.

Actual insurance expenditure incurred in the current regulatory period is shown in Table L.2. This is shown in comparison with the 2010 forecast by GAWB and the QCA's allowed insurance expenditure determined in 2010.

Table L.2: ALCM – Insurance Expenditure ($000)

Insurance costs	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
GAWB actual insurance expenditure[20]	531	647	763	691	736
Annual increase		21.8%	17.9%	-9.4%	6.5%
QCA 2010 allowed insurance expenditure	696	731	767	786	805
Difference	-165	-84	-4	-95	-69

[20] O3.1 Insurance summary - includes historical costs and forecast.pdf

As can be seen in Table L.2, GAWB expenditure is below that allowed for by the QCA in its 2010-15 determination. It can also be noted from Table L.2 that insurance expenditure can be fairly volatile depending on the impact of insurance claims on premiums and the effectiveness of the brokering service employed.

Table L.3 tabulates the proposed cost of the insurance expenditure within the 2015 to 2020 budget.

Table L.3: ALCM – Insurance proposed opex[21]

Source	2014-2015 ($'000)	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
GAWB, 2015 Price Monitoring Investigation *Submission to the Queensland Competition Authority, September 2014, Table 17, page 22*	736	772	810	850	892	936
GHD, Report for Gladstone Area Water Board *- Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review, Appendix C*	725	743	761	780	799	818

The insurance cost forecast from GAWB's consultant's report[22] was attached to the GAWB's submission to the QCA. These are in real FY2015$. The insurance costs forecast submitted by GAWB in its submission to the QCA is in nominal $ terms. Adjusting for an assumed 2.5% inflation rate (CPI), the cost forecast provided by GAWB's consultant is lower than that provided by GAWB by about $10,000 p.a.[23]. In our analysis below, we have used GAWB's forecast costs.

L.3 Documentation reviewed

The key reference documents used for this review are:

- GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, September 2014
- GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
- O3.1 Insurance summary - includes historical costs and forecast.pdf
- O3.2 Insurance forecast detail.xlsx
- O3.3 Curtis Island insurance allocation.pdf
- O3.4 Allowance for insurance excess claim.pdf
- O3.5 Marsh Insurance letter re escalation rate.pdf
- O3.6 GAWB Insurance Procurement Process.pdf

L.4 Prudency

An inspection of the GAWB bulk water infrastructure showed that its assets are located over an area of approximately 800 km^2 and include:

- Awoonga Dam
- Water treatment plants in Gladstone City and at Yarwun

[21] These proposed insurance costs exclude insurance for Curtis Island assets. An allocation for Curtis Island assets has been removed from the cost of insurance.
[22] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
[23] This may be due to the GAWB's consultant not including an allowance for the payment of claims excess. GAWB has included in its proposed expenditure such an allowance of $11,165 in 2015.

- Delivery pipelines for delivery of bulk raw water to treatment plants and industrial customers and for delivery of potable water to GRC's water reticulation systems and to other industrial customers
- Raw water pumping station at Awoonga Dam and potable water pumping stations at Benaraby Calliope, Glen Eden, Boat Creek, Gladstone Water Treatment and Yarwun Water Treatment Plant
- Raw water reservoirs at Gladstone (Fitzsimmons Street) and Toolooa, and potable water reservoirs at Boyne Island, East End, Golegumma, Mt Miller, Curtis Island and South Gladstone
- Lake Awoonga Recreation Area adjacent to Awoonga Dam (including a waste water treatment plant)

Major risks besides accidents and property damage or loss that may impact on the business viability of GAWB include flood and spill events, as well as other normal business risks. Industrial Special Risk (ISR) insurance is procured based on specific on assets and sites. This enables GAWB to procure insurance specific to each asset or site and to the activities that take place at these sites, especially at the dams, reservoirs, treatment plants and pumping stations where there exists a real risk that major events may occur. GAWB also operates a fleet of vehicles including trailers and tractors as well as motor vehicles, some of which insurance is not included in the cost of the leases for these vehicles and thus must be obtained separately. Given the conditions in which GAWB operates, we are of the view that the expenditure is prudent.

L.5 Efficiency

In this section we determine if the expenditure is efficient or not efficient.

L.5.1 Calculation of costs

Forecast costs are estimated by GAWB based on the 2014/15 costs, escalated by 5% p.a. The impact of claims excess is not escalated. Also included in the proposed expenditure is the fee paid to GAWB's insurance broker. An allocation from the total insurance expenditure to the cost of Curtis Island is provided in the proposed expenditure. As such while the specific insurance expenditure reviewed includes insurance costs for GAWB's Curtis Island assets, the total proposed expenditure for insurance excludes the Curtis Island assets. Also included in the calculation of costs is the State Government's stamp duty which has increased to 9% from 7.5% in the previous year. From our analysis of the increase in insurance premiums over recent years, particularly in the aftermath of flood events, we find this 5% p.a. escalation to be reasonable over a five year period.

The proposed insurance cost forecast is provided in Table L.4 which includes an allocation to Curtis Island that which we understand will be stripped out in the determination.

Table L.4: ALCM – Proposed insurance cost

Insurance	2015 base[24]	2016	2017	2018	2019	2020
Industrial Special Risks	$438,790	$460,730	$483,766	$507,954	$533,352	$560,020
Marine - Hulls	$4,496	$4,721	$4,957	$5,205	$5,465	$5,738
Group Personal Accident	$1,097	$1,152	$1,209	$1,270	$1,333	$1,400
Motor Vehicle	$7,846	$8,238	$8,650	$9,083	$9,537	$10,014
Multi Risk Premium	$10,897	$11,442	$12,014	$12,615	$13,245	$13,908
Combined Liability	$267,560	$280,938	$294,985	$309,734	$325,221	$341,482
Total insurance premiums	$730,686	$767,220	$805,581	$845,860	$888,153	$932,561
Professional Fee - Mercer	$45,455	$47,727	$50,114	$52,619	$55,250	$58,013
Add Excess	$11,165	$11,165	$11,165	$11,165	$11,165	$11,165
Total insurance cost	$1,517,992	$1,593,333	$1,672,441	$1,755,505	$1,842,721	$1,934,301

[24] O3.2 Insurance forecast detail.xls

The cost of excess has been estimated by taking into account actual historical excess expenses over the past four years from 2010/11 to 2013/14. Over this period insurance excess were paid for claims relating to motor vehicles and a flood event. The excess related to claims as provided by GAWB is reproduced in Table L.5 below.

Table L.5: ALCM – Insurance claims – excess paid

Year	Amount	Related to
2010/11	$1,000	2 motor vehicle claims
2011/12	$1,818	4 motor vehicle claims
2012/13	$455	1 motor vehicle claim
	$50,000	Flood event claim
2013/14	$2,555	5 motor vehicle claims

While these excess relate to claim events over four years, GAWB has applied the excess over a five year regulatory period. Also some of the amounts in the information provided by GAWB are understood to be after GST and others post GST. However, any impact of this difference in treatment is minor and in its forecast of insurance expenditure, GAWB has applied an annual excess $11,165 which is not subject to escalation.

L.5.2 Delivery of service

GAWB has engaged Marsh Pty Ltd as their insurance brokers. This is appropriate as Marsh is an insurance industry specialist who has a reputation for providing value for money in keeping insurance coverage at an appropriate level for an organisation like GAWB and premiums that reflect market conditions. In its presentation to GAWB, Marsh provides a summary of the insurance needs of GAWB and a strategy to ensure that the insurance obtained addresses GAWB's requirements. Marsh markets the liability risks of a number of Australian utilities as the 'Utility Insurance Liability Program' which takes account of the differing exposures of participants, to ensure that competitive terms are obtained.

We also note that in 2010, GAWB had proposed a premium for self-insurance which was rejected by the QCA. In the current submission, GAWB has not proposed to include any premium for self-insurance.

L.5.3 Market conditions

The pricing of insurance premiums is complex and a number of factors can influence pricing over the 5 year regulatory period. These include:

- The state of the insurance market i.e. how competitive the insurance market is at any given time
- Reinsurance costs as a risk management tool to diversify risk
- Local catastrophes in particular flood and cyclone losses
- Worldwide losses such as earthquakes and hurricanes
- Prevailing Interest rates
- GAWB's own loss history
- Value of GAWB's assets

Different insurance companies will evaluate these risks and cost premiums to reflect these factors differently and thus there is always a need to test the market when obtaining insurance coverage. The use of a knowledgeable broker like Marsh will assist GAWB in this regard. In its presentation[25] to GAWB, Marsh provided

[25] Marsh, *Gladstone Area Water Board, Renewal Strategy Meeting*, March 2014

a strategy to define GAWB's risk profile and obtain quotations from other suitable insurance providers in addition to the incumbent.

L.5.4 Efficiencies and economies of scale

Engaging an insurance broker that has knowledge of the insurance market and other large clients enables GAWB to tap into the knowledge and buying power of the broker. This will lead to greater efficiencies and economies of scale than for an individual organisation for which insurance is not a core business activity. The broker will also want to show to its clients including GAWB that value for money is achieved by ensuring premiums are low so as to maintain that relationship in the long term.

L.5.5 Benchmarking

Marsh has provided a comparison of GAWB with two of its other water industry clients in terms ISR and liability. The report shows that the premium for ISR based on the asset value shows GAWB's premium rate at 0.046% while the other companies have premium rates are 0.03% and 0.062%. However with GAWB being significantly smaller than the other two companies, (GAWB's asset value is about $800 million while the other two companies have asset values around $10 billion) the premiums charged are correspondingly different. In terms of liability, GAWB's premium is materially below the other two companies reflecting their good claim history (GAWB has not had a claim while the other two companies have had significant claims).[26]

L.6 Trade-offs with capex

There are no trade-offs with capex for this opex item.

L.7 Policies and procedures

GAWB's public and products liability insurances renew on 30 September each year, with all other insurances renewing on 1 July. The renewal process commences each year with a discussion with Marsh which covers:

- Insurance market conditions
- Current limits and deductibles
- What can and/or will impact GAWB's insurance program, e.g. claims history
- Strategy – which markets to approach, what options to obtain

The GAWB executive responsible for management of the insurance program liaises with Marsh over subsequent months and provides updates to GAWB's Audit & Risk Management Committee.

In June 2014, Marsh provided a report setting out the various options and their recommendations for renewal of the policies expiring on 1 July 2014. GAWB Management reviewed this report with Marsh, and provided a management report (including a review of the cover proposed and deductibles, a comparison of the premium cost with budget and the amount approved by the QCA at the 2010 Price Review, and Management's recommendations) to the Board. Following Board approval, Marsh was instructed to proceed with the renewal on the basis approved by the Board.

A similar process was followed in September for the renewal of the liability policies. Marsh also provided GAWB with an annual Water Industry Insurance and Risk Benchmarking Report, a comparison of GAWB's ISR and Liability policy coverage and premiums with two other Queensland water entities for whom it acts.

Given the above, we consider that the policy and procedure followed by GAWB in obtaining insurance coverage is in keeping with good practice.

[26] Marsh, *Water Industry Benchmarking*, attached to O3.6 GAWB Insurance Procurement Process.pdf

L.8 Assessment of reported expenditure

The expenditure on insurance proposed by GAWB is based on the actual insurance expenditure for 2013/14, escalated by 5% to 2014/15. This escalation takes into account advice from their insurance broker, Marsh Pty Ltd. The expected opex expenditure for 2014/15 then forms the basis for all opex forecast and for insurance expenditure, the 5% escalation rate continues to apply for the whole of the forthcoming regulatory period from 2015/16 through to 2019/20. For both 2013/14 actual expenditure and 2014/15 base year expenditure, GAWB's expenditure for insurance is below that allowed by the QCA during the 2010 price review. The insurance contracts obtained by GAWB were market tested and were subject to the competitive quotation process implemented by GAWB through their broker during the 2013/14 insurance contract renewable process. Given these conditions, we find that the insurance expenditure for 2013/14 is efficient.

However, as we consider that GAWB's application of a proposed escalation rate of 5% is excessive. In keeping with our insurance escalator forecasts over the next five years, we recommend that the proposed increase for insurance be limited to 2.5% for the first year before rising to 5% p.a. over the next four years of the regulatory period. Whilst we find that GAWB's proposed insurance expenditure is efficient we recommend that the expenditure is reduced to reflect a lower escalation rate over the regulatory period. Table L.6 below tabulates our recommended opex for insurance.

Table L.6: Jacobs' determined efficient insurance expenditure

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Jacobs Determined Efficient Insurance Expenditure	754	792	832	873	917

L.9 Extrapolation to other projects

Jacobs does not recommend the extrapolation of our recommendation of insurance expenditure to other costs items as this is not a core business expenditure item. It is also a cost item that GAWB is not fully in control of its expenditure and is subject to conditions that are specific to the insurance market.

L.10 Summary, conclusion and recommendation

The expenditure on insurance is assessed as prudent as the primary driver of this cost is the need to protect the value of its assets and ensure that unexpected costs from events beyond its control are covered. An appropriate decision making process has been put in place to determine the requirements for insurance through the engagement of a specialist insurance broker like Marsh Pty Ltd is appropriate.

We also assess the expenditure as efficient.

L.10.1 Summary

Table L.7 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table L.7: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Insurance	Prudency		GAWB faces some risks of events occurring beyond its control which may result in losses that would threaten is business viability. Obtaining insurance for such events is prudent.
	Efficiency		The insurance contracts obtained by GAWB were market tested and were subject to the competitive quotation process. While we find that GAWB's proposed insurance expenditure is efficient we recommend that the expenditure is reduced to reflect a lower escalation rate over the regulatory period.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

L.10.2 Recommendations

We recommend the adoption of the insurance expenditure shown in Table L.8.

Table L.8: Jacobs' determined efficient insurance expenditure

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Jacobs Determined Efficient Insurance Expenditure	754	792	832	873	917

Appendix M. Opex – motor vehicles, ALCM

M.1 Executive summary

Table M.1 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table M.1: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Motor Vehicles	Prudency		Motor vehicles fit for purpose are required due to the extent and terrain in which GAWB operates
	Efficiency		Acquisition of Toyota Camry is unnecessary although any savings are minor due to the need to source alternative transport (taxis) when there is a co-incident requirement for two vehicles. Proposed fuel costs are not consistent with prevailing market conditions.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

M.2 Overview of opex

Motor vehicles have been identified as a key component of GAWB's asset life cycle management (ALCM) expenditure. GAWB's policy regarding the provision of a business motor vehicle provides that all company vehicles, including vehicles salary packaged/sacrificed, and are to be available to other employees for the purpose of work. Pooled vehicles are to be utilised first by staff however where pooled vehicles are unavailable, salary packaged vehicles are to be made available subject to the requirements of the business and vehicle user.

Such salary packaged vehicles are not for the exclusive use of the employees who makes the cost contribution for the personal use of the vehicle. GAWB as the lease holder/ owner of the vehicle retains the right to allow other employees to use the vehicle if a need arises and no pool vehicles are available. To have a packaged/sacrificed vehicle, firstly there must be a business need for such a vehicle. Salary packaged/ sacrificed vehicles allow the employee to have personal use of such vehicle outside of their work. However, the cost of such use is estimated and the employee makes a contribution to GAWB for this purpose.

All but two of the vehicles included in this expenditure category are utility vehicles or four wheel drive vehicles reflecting the work requirement for such vehicles and the terrain covered.

Prior to 2010, GAWB outsourced its maintenance programme. From 2010, this function was brought in house. This has resulted in motor vehicle costs increasing by over 50% between 2010/11 and 2013/14 as previously much of these costs had been contained within its outsourced maintenance budget. As GAWB increased its maintenance capability and staffing numbers related to maintenance, a corresponding increase in motor vehicle cost was incurred. This is shown in Table M.2**,** which provides the actual expenditure of the Motor Vehicles in comparison with the 2010 forecast by GAWB and the QCA's allowed expenditure determined in 2010.

Table M.2: ALCM – Motor Vehicles opex ($000, 2015$)[27]

Motor Vehicle costs	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Actual Motor Vehicle cost	540	637	813	825	750

[27] GHD, Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review, Appendix C

Motor Vehicle costs	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Annual increase		18.0%	27.6%	1.5%	-9.1%
QCA 2010 allowed MV expenditure	279	272	266	257	258
GAWB's 2010 proposed MV expenditure (nominal $)[28]	236	241	247	253	259

As can be seen in Table M.2, the increase between 2011-12 and 2012-13 was significant at an average increase of 22.8%. This reflects the increase in operational and maintenance staffing levels for the business over this period. However as staff levels stabilised in 2014, the increase in the costs of motor vehicles also ameliorated. Motor vehicle expenditure is also significantly in excess of the motor vehicle expenditure allowed by the QCA in its 2010 decision by an average of 170% for each year of the regulatory period.

Table M.3 shows the proposed cost of the Motor Vehicles within the 2015 to 2020 budget.

Table M.3: ALCM – Motor Vehicles proposed opex ($'000)

Source	2014-2015 ($'000)	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)	Total
GAWB, *2015 Price Monitoring Investigation Submission to the Queensland Competition Authority*, September 2014, Table 17, page 22	750	767	786	806	826	847	4,782
GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, Appendix C	749.5	748.1	748.3	748.4	748.4	748.4	4,491.0
O4.1 Motor Vehicles forecast summary - includes historical costs and forecast.pdf	749.5	748.1	748.3	748.4	748.4	748.4	4,491.0

The motor vehicle cost forecast from GAWB's consultant's report[29] corresponds to the O4.1 Motor Vehicles forecast summary PDF document provided by GAWB. These are in real FY2015$. The motor vehicle costs forecast submitted by GAWB in its submission to the QCA is in nominal $ terms based on a 2.5% inflation rate. Adjusting for this difference, the motor vehicle cost forecast from the various documents submitted by GAWB is consistent.

M.3 Documentation reviewed

The key reference documents used for this review are:

- GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, September 2014
- GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
- O4.1 Motor Vehicles forecast summary - includes historical costs and forecast.pdf
- O4.3 EDOCS_n77743_v5_Motor_Vehicle_Acquisition_and_Management_Guidelines.pdf
- O4.2 Motor Vehicles forecast detail.xlsx

[28] QCA, *Final Report, Gladstone Area Water Board: Investigation of Pricing Practices*, June 2010, Table 8.3 p147
[29] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014

M.4 Prudency

An inspection of the GAWB bulk water infrastructure showed that its assets are located over an area of approximately 800 km^2 and includes:

- Awoonga Dam located about 30 km south of Gladstone
- Water treatment plants in Gladstone City and at Yarwun about 15 km west of Gladstone
- Delivery pipelines stretching 30 km to 40 km to the south and west as well as over to Curtis Island for delivery of bulk raw water to treatment plants and industrial customers and for delivery of potable water to GRC's water reticulation systems and to other industrial customers
- Raw water pumping station at Awoonga Dam and potable water pumping stations at Benaraby (20 km south of Gladstone), Calliope (25 km south west), Glen Eden (10 km south), Boat Creek (15 km west), Gladstone Water Treatment and Yarwun Water Treatment Plant
- Raw water reservoirs at Gladstone (Fitzsimmons Street) and Toolooa (5 km south), and potable water reservoirs at Boyne Island (25 km southeast), East End (40 km west), Golegumma (25 km south), Mt Miller (15 km west), Curtis Island and South Gladstone
- Lake Awoonga Recreation Area adjacent to Awoonga Dam (including a waste water treatment plant)

Access to many of these sites, especially the dams and reservoirs, for maintenance and operational purposes is often via steep unsealed tracks that require four wheel drive vehicles. Given these conditions, we are of the view that the expenditure is prudent.

M.5 Efficiency

In this section we determine if the expenditure is efficient or not efficient.

M.5.1 Calculation of costs

Costs are estimated by GAWB based on annual lease costs plus fuel costs less employee contributions. For vehicles that are not fully allocated to the business, employees make a contribution via salary sacrifice based on the level of personal use. Salary packaged/ sacrificed vehicles allow the employee to have personal use of vehicles allocated to them outside of their working activities. All leased vehicles are covered by a fully maintained operating lease which covers all servicing costs, labour, spare parts and repairs to faulty components identified within the service inspection.

GAWB has provided us with a breakdown of its expected motor vehicle costs including lease payments and fuel costs less contributions from employees for fringe benefits tax and additional contributions for obtaining a vehicle with a cost beyond that deemed appropriate for the requirement of the position of the employee. Table M.4 shows the expected annual costs for motor vehicle expenditure.

Table M.4: ALCM – Details of motor vehicles expenditure

Make	Model	Lease Company	Lease Terms (Months)	Business %	Lease PA	Employee BT Contributions	Employee AT Contributions	Fuel PA	Total MV Expenditure	km Travelled
Toyota	**Landcruiser Prado GX**	SG Fleet	36	65%	$17,470	$(3,460)	$(7,374)	$4,636	$11,272	27,193
Nissan	**Navara DC ST D40**	SG Fleet	36	91%	$15,684	$(3,070)	$(1,240)	$4,121	$15,495	24,171
Mazda	**BT50**	SG Fleet	36	61%	$21,229	$(2,355)	$(5,621)	$6,182	$19,435	36,257
Toyota	**Hilux SR**	SG Fleet	36	100%	$16,165			$4,636	$20,801	27,193
Ford	**Ranger XL**	SG Fleet	36	100%	$15,335			$4,636	$19,971	27,193
Toyota	**Prado VX**	SG Fleet	36	77%	$18,309	$(3,033)	$(5,082)	$4,636	$14,830	27,193
Toyota	**Hilux SR5 DC**	SG Fleet	36	95%	$22,515			$6,182	$28,697	36,257
Jeep	**Grand Cherokee**	SG Fleet	36	88%	$23,209	$(791)	$(1,344)	$6,182	$27,256	36,257
Toyota	**Hilux SR5**	Toyota FS	36	74%	$14,588	$(889)	$(4,993)	$4,636	$13,342	27,193
Toyota	**Landcruiser Prado GXL**	SG Fleet	36	71%	$16,149	$(720)	$(5,587)	$3,091	$12,933	18,128
Nissan	**Navara ST-X 550**	Custom Fleet	36	90%	$22,400		$(1,602)	$4,636	$25,434	27,193
Hyundai	**Santa Fe**	SG Fleet	36	38%	$11,477	$(1,013)	$(8,446)	$2,576	$4,594	15,107
Infiniti	**FX37 GT**	Custom Fleet	30	40%	$20,161	$(28,600)		$3,091	-$5,348	27,193
Toyota	**Landcruiser Prado GXL**	SG Fleet	36	93%	$15,154		$(3,137)	$3,864	$15,881	22,661
Toyota	**Hilux SR Extra**	Custom Fleet	36	100%	$14,752			$3,864	$18,616	22,661
Toyota	**Hilux SR5 DC**	SG Fleet	36	60%	$14,625		$(7,162)	$3,864	$11,327	22,661
Suzuki	**Grand Vitara**	SG Fleet	36	100%	$11,678			$4,636	$16,314	27,193

Make	Model	Lease Company	Lease Terms (Months)	Business %	Lease PA	Employee BT Contributions	Employee AT Contributions	Fuel PA	Total MV Expenditure	km Travelled
Mitsubishi	**Pajero**	Custom Fleet	36	100%	$22,968			$6,182	$29,150	36,257
Toyota	**Hilux SR Xtra-Cab**	Toyota FS	36	100%	$14,531			$4,636	$19,167	27,193
Toyota	**Hilux SR 4x4**	Toyota FS	36	90%	$13,576		$(909)	$4,636	$17,303	27,193
Isuzu	**D-max**	Custom Fleet	36	100%	$13,994			$3,864	$17,858	22,661
Toyota	**Landcruiser 70**	SG Fleet	36	100%	$22,783			$4,636	$27,419	27,193
Toyota	**Landcruiser Workmate**	SG Fleet	36	94%	$27,642		$(2,204)	$9,273	$34,711	54,385
Toyota	**Hilux**	SG Fleet	36	100%	$15,118			$6,182	$21,300	36,257
Toyota	**Tarago Gli**	SG Fleet	36	100%	$12,789			$2,318	$15,107	13,596
Toyota	**Camry**	Toyota FS	36	100%	$6,699			$2,318	$9,017	13,596
Nissan	**Dualis2 TiL**	Custom Fleet	36	65%	$11,460	$(780)	$(5,491)	$3,864	$9,053	22,661
Toyota	**Landcruiser**	SG Fleet	36	100%	$18,592			$2,576	$21,168	15,107
Toyota	**Hilux SR T/D X-tra Cab**	Custom Fleet	36	90%	$17,108		$(612)	$4,636	$21,132	27,193
Toyota	**Hilux Xtra Cab 4WD**	Toyota FS	36	100%	$12,973			$4,636	$17,609	27,193
Toyota	**Hilux SR C/Chas 4WD**	Custom Fleet	36	100%	$16,741			$4,636	$21,377	27,193
Toyota	**Hilux SR 4x4**	Custom Fleet	36	100%	$15,733			$4,636	$20,369	27,193
Toyota	**Hilux 4x4 SR**	SG Fleet	36	90%	$16,925		$(856)	$4,636	$20,705	27,193
Toyota	**Landcruiser**	Custom Fleet	36	100%	$31,845			$9,273	$41,118	54,385

Make	Model	Lease Company	Lease Terms (Months)	Business %	Lease PA	Employee BT Contributions	Employee AT Contributions	Fuel PA	Total MV Expenditure	km Travelled
Toyota	**Landcruiser Prado**	Custom Fleet	36	70%	$19,725		$(7,738)	$4,636	$16,623	27,193
Toyota	**Hilux SR4*4**	Custom Fleet	36	90%	$17,172		$(1,230)	$6,182	$22,124	36,257
Volkswagon	**Amorak**	Custom Fleet	24	60%	$18,712	$(2,673)	$(5,494)	$4,636	$15,181	27,193
Toyota	**Hilux SR4*4**	Custom Fleet	36	100%	$17,594			$6,182	$23,776	36,257
Toyota	**Hilux SR4*4**	Custom Fleet	36	100%	$15,123			$4,636	$19,759	27,193
Other - Fuel for use of private vehicles					$13			$502	$515	
MV Registration									$10,745	
MV Repairs and maintenance									$6,403	
Total Expenditure									**$749,539**	

M.5.2 Delivery of service

Prior to 2010, when maintenance was mainly out sourced, motor vehicle costs were materially lower by about a third as a significant number of lease vehicles related to maintenance. As a result of insourcing of maintenance, the cost of leasing and maintaining a fleet increased substantially.

The majority of GAWB's fleet vehicles retained are subject to an Operational Lease. These operate through one of three leasing companies SG Fleet Australia, Toyota Financial Services and Custom Service Leasing which GAWB have Master Leasing Agreements in place (under review in 2015).

Previously GAWB engaged QFleet to provide lease vehicles. However the cost of leasing vehicles from QFleet proved to be greater than through the commercial leasing companies. As a result, it was decided that the normal procurement process will apply to the leasing of vehicles and GAWB has therefore engaged the three leasing companies on a competitive basis that currently provide the vehicles. Despite not using QFleet, GAWB continues to enjoy Queensland Government fleet discounts available to Queensland government bodies. We therefore consider that the procurement process is efficient.

M.5.3 Market conditions

The cost of vehicles is currently relatively low given the high Australian dollar and low interest rates. Low growth in world economic conditions as well as the increase in oil supplies has dampened world oil prices despite heightened uncertainty and conflict in the various parts of the Middle East. These conditions have suppressed the cost of operating a fleet of motor vehicles.

M.5.4 Efficiencies and economies of scale

As a Queensland government owned entity, GAWB enjoys fleet discounts and may amount up to 20% of the cost of a vehicle. This cost reduction is reflected in lower lease costs than would otherwise be the case.

GAWB also informed us that, for recent leases of commercial vehicles, Ford Rangers have been procured in preference to Toyota Hilux's' that had been previously leased on the grounds of being more cost effective. This has resulted in lower leasing costs for vehicles that fulfil the requirements of the business.

M.5.5 Benchmarking

Overall, GAWB leases 39 vehicles for a staff compliment of approximately 80 employees. In most instances, this would be seen to be a high ratio of vehicles to staff. However, examining staff positions and their functions indicates that a relatively large number of staff do require vehicles to access various parts of the GAWB network and often, in areas that are serviced by steep and unseal tracks. These include operational staff, maintenance workers such as fitters and electrician as well as scientists, catchment management officers and rangers.

The main cost driver for motor vehicles expenditure is the extent and terrain of the GAWB network. The need to be able to access promptly the dams, reservoirs and pump stations which are located in rural areas often along steep unseal tracks means that operating a safe and reliable four wheel drive vehicle is required by those requiring access to these sites on a regular basis.

An assessment of the type and leasing cost of vehicles indicates in most cases, the vehicles chosen is appropriate and the leasing costs is within an acceptable range taking into account market conditions. The average cost of leasing a vehicle is about $17,200 p.a. and only seven out of the 39 vehicles leased are at a cost of greater than $22,000 p.a. A few vehicles do stand out. These are the leasing of:

- Landcruiser for $31,845 by a Catchment Management Officer
- Landcruiser Workmate for $27,642 by another Catchment Management Officer

However, it is also noted that these two officers also travel the largest distance (over 54,000 km p.a. each) and given the nature of their work as Catchment Management Officers which would necessitate accessing areas in

the Awoonga Dam catchment area that is beyond the reach of the GAWB network and in more inaccessible areas than around the vicinity of the Dam wall, the leasing of such vehicles are seen by us as appropriate.

Two other vehicles are not in keeping with the character of the others. These are the Toyota Camry and Tarago leased for $6,699 and $12,789 respectively. These vehicles are deemed to be 100% business use for the use of administration staff (Camry) and for Board/Group Site Tours (Tarago). The distances covered by these two vehicles are comparatively low (the lowest of all vehicles leased by GAWB) at about 13,500 km p.a. each.

The estimated cost of fuel has been based on $1.55 per litre ex GST. This is considered to be excessive our analysis of market fluctuations in the cost of fuel. According to the RACQ, average cost of regular unleaded and diesel in Gladstone is currently approximately $1.50 per litre including GST having fallen from an average of around $1.55 including GST per litre over 2013.

M.6 Trade-offs with capex

Motor vehicles may be acquired outright which would mean that the cost of motor vehicles will be included in GAWB's balance sheet as an asset and depreciation applied. GAWB has taken the decision to acquire motor vehicles via operating leases. From our analysis, the cost impacts of both options do not differ significantly. The ownership and operation of motor vehicles is not seen as core business for GAWB and thus the decision to acquire motor vehicles via operating leases, in which all maintenance, fuel and other operating costs are covered, is seen as appropriate as it does not required GAWB to employ dedicated staff to manage the acquisition and operations of the fleet.

M.7 Policies and procedures

GAWB's policy regarding all company vehicles supplied by the organisation, including vehicles salary packaged/sacrificed, stipulates that all vehicles are to be available to other employees for the purpose to work. Pooled vehicles are to be utilised first by staff. However, where pooled vehicles are unavailable, salary packaged vehicles are to be made available subject to the requirements of the business and vehicle user.

The salary packaged vehicles are not for the exclusive use of the employee contributing towards personal use, as GAWB is the lease holder/ owner of the vehicle. To have a packaged/sacrificed vehicle, firstly there must be a business need for such a vehicle. Salary packaged/ sacrificed vehicles allow the employee to have personal use of such vehicle outside of their work.

Lease payments cover both the cost of the car as well as scheduled servicing, road side assistance and insurance. If a driver has an accident in a GAWB owned/salary packaged vehicle, whilst using the vehicle for private use, and is deemed to be at fault, the driver, will be liable to meet a portion of the excess in accordance with private use component of the vehicle.

The provision of a motor vehicle to an employee for private use is subject to FBT. The taxable value is recouped from the employee as a contribution towards the cost of the vehicle. The amount allocated to an employee's taxable income comprise the total cost of providing the relevant salary packaged vehicle chosen by the employee (including FBT) less the amount which will be borne by GAWB based on the business use cost of the appropriate base vehicle. The base level vehicle is the minimum standard of vehicle, including essential accessories, required to accomplish GAWB job requirements. Vehicle choices are determined in consultation with the employee, and by the job requirements of GAWB business including managers and health and safety assessments of necessary operational requirements, the estimated lease and running costs over the projected life of the vehicle.

In determining the choice of vehicle, consideration is given to:

- The suitability of the vehicle for the intended work/business purpose
- Does the features of the vehicle meet serviceability and reliability standards
- Vehicle availability

If an employee wishes to salary package a vehicle, the employee's manager will review if there is a business need for a vehicle and the Manager and employee will estimate business use versus private use ratio.

The initial calculation of the business use component is based upon an estimated percentage which will be confirmed through the keeping of a log book for a minimum of 12 weeks with any adjustments to be made to the salary package subsequent to this period.

We consider that the policy and procedure followed by GAWB in determining the requirement for motor vehicles and its allocation to staff is robust and is in keeping with good practice.

M.8 Assessment of reported expenditure

While the expenditure on motor vehicles is considered prudent, we consider that the forecast value is not efficient. We are of the opinion that the leasing of the Toyota Camry for administrative staff is unnecessary as the annual distance travelled is low and its function can be combined with the Toyota Tarago which is also relatively underutilised but has a larger carrying capacity.

In its response to our draft report GAWB provided additional information regarding the utilisation of these two vehicles and the cost of alternative forms of transport (taxis). GAWB indicated that the two vehicles are often used the same day (GAWB was unable to indicate if the vehicles were used at the same time as the logbooks do not record time of vehicle use, only dates). GAWB also indicated that the Tarago was used for 200 trips while the Camry for 520 trips with the majority of trips being around 35 km. Assuming that half of the Tarago's trips were coincident in time with the Camry being used, 620 trips could be serviced by one vehicle with the other 100 trips necessitating the use of alternate means of transport. Given that the annual cost of the Camry (including fuel) amounts to about $9000 p.a., each km of travel by the second vehicle costs approximately $2.60. The cost of a taxi in Gladstone is $2.26 per km (excluding booking and flag fall charges). Savings from not leasing the Camry (including fuel) would amount to about $1,000 p.a. ($9000 less $2.26 X 3500 km).

The reduction in maintenance staff does not impact on the number of vehicle leased as the reduced maintenance worker does not have a vehicle allocated. (Only 7 vehicles have been allocated to the electricians and mechanical fitters).

The cost of fuel is estimated based on $1.55 per litre ex GST. We consider this to be excessive and we recommend applying a cost of $1.35 per litre ex GST in line with current market analysis undertaken by RACQ. Discussion with GAWB staff also indicates that a fuel cost of $1.35 per litre ex GST is a more appropriate cost to use for fuel in keeping with their experience. Applying a fuel cost of $1.35 per litre instead of $1.55, results in a reduction in motor vehicle expenditure of about $24,000 p.a.

Table M.5 below tabulates our recommended revised opex for motor vehicles together with GAWB's budgeted opex.

Table M.5: Motor Vehicles revised opex

Opex	2014-2015 ($'000)	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Proposed Motor Vehicle Expenditure		767	786	806	826	847
Recommended Motor Vehicle Expenditure		743	761	780	800	820
MV lease cost	670.7					
less Salary sacrifice before tax	-47.4					
less Salary sacrifice after tax	-76.1					
Fuel cost	161.3					
MV registration	10.7					
MV repairs & maintenance	6.4					

Opex	2014-2015 ($'000)	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Less MV (Camry) efficiency	-1.0					
Total MV Cost (actual and recommended future)	724.6	743	761	780	800	820

M.9 Extrapolation to other projects

Jacobs does not recommend the extrapolation of our recommendation of motor vehicle to other costs items as this is not a core business expenditure item.

M.10 Summary, conclusion and recommendation

The expenditure on motor vehicles is assessed as prudent as the primary driver of this cost is the extent and terrain of the GAWB network and has been demonstrated. An appropriate decision making process has been put in place to determine the requirements for a motor vehicle by appropriate staff.

We assess the expenditure as partially efficient. The acquisition of a Toyota Camry is considered unnecessary; however any savings are minor as alternative transport options will need to be sourced (taxis) when both the Camry and Tarago are required concurrently. Proposed fuel costs are not consistent with prevailing market conditions and adjustments have been recommended.

M.10.1 Summary

Table M.6 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table M.6: Summary of prudency and efficiency

Opex	Assessment	Outcome	Summary
Motor Vehicles	Prudency		Motor vehicles fit for purpose are required due to the extent and terrain in which GAWB operates
	Efficiency		Acquisition of Toyota Camry is unnecessary although any savings are minor due to the need to source alternative transport (taxis) when there is a co-incident requirement for two vehicles. Proposed fuel costs are not consistent with prevailing market conditions.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

M.10.2 Recommendations

We recommend the adoption of the motor vehicle expenditure shown in Table M.7.

Table M.7: Jacobs determined motor vehicles opex

Opex	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Jacobs Determined Motor Vehicle Expenditure	743	761	780	800	820

Appendix N. Opex – electricity, operations

N.1 Executive summary

Table N.1 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table N.1: Summary of prudency and efficiency

Expenditure	Assessment	Outcome	Summary
Electricity expenditure	Prudency		Electricity is required for the pumping and treatment of water and the volume of energy used are dependent on demand for water.
	Efficiency		The expenditure is assessed as partially efficient under the current operating constraints as we consider that the escalators applied by GAWB are inconsistent with recent AER draft determinations and Ergon Energy's pricing submission to the AER. We also expect that risk management measures could be implemented to limit adverse electricity market price movements which will lead to lower electricity prices in base year prices as well as prices in subsequent years. We further expect that efficiencies in the use and cost of electricity can readily be achieved once the operating constraints that GAWB faces are relaxed by various capital works initiatives e.g. installation of VFDs limiting peak demand charges and installation of higher pumping capacity at GWTP allowing greater off-peak pumping.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

N.2 Overview of opex

The cost of electricity has been identified as a key component of GAWB's cost of operations. The largest component of GAWB's electricity cost is the cost of running the pumps at the Awoonga Dam Pump Station. The expenditure on electricity is dependent on the pumping regime the GAWB adopts. However as the over-riding focus of GAWB's pumping activities is the supply security of water, the cost of electricity is a secondary concern. The pumping regime is also significantly influenced by the maintenance activities being undertaken throughout the water distribution network and the need to maintain an appropriate level of in-system storage so that reliability of water supply to customers is not impacted. As GAWB does not have a second water source and must pump water from Awoonga Dam every 24 hours to replenish delivery network storage, options to alter the pumping regime are limited.

GAWB has seen considerable increases in its electricity expenditure over the current regulatory period. The increases are primarily attributable to the prevailing market forces and the impact of the Carbon Tax. With the repeal of the Carbon Tax however, any further increases should be ameliorated.

Table N.2 provides the actual expenditure on electricity between 2010 and 2015.

Table N.2: Operations– Actual electricity opex ($000)[30]

Operations electricity costs	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	Average
Actual electricity cost (real 2015$)	1,344	1,720	1,867	2,211	1,991	1,871
Annual increase		19.9%	16.7%	15.5%	-10.0%	

[30] O6.1 Electricity summary - includes historical costs and forecast.xlsx
GHD, Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review, Appendix C

Actual electricity cost (nominal $)	1,340	1,600	1,864	2,157	1,991	
Annual increase		19.4%	16.5%	15.7%	-7.7%	
QCA 2010 electricity allowance (nominal $)	1,286	1,350	1,476	1,616	1,768	

Over the forecast period, GAWB has assumed that the consumption of electricity remains constant.

Table N.3 shows the proposed cost of electricity within the 2015 to 2020 budget.

Table N.3: ALCM – Electricity proposed opex ($'000)

Source	2014-2015 ($'000)	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)	Total
GAWB, *2015 Price Monitoring Investigation Submission to the Queensland Competition Authority*, September 2014, Table 16, page 21	1,991	2,186	2,401	2,631	2,796	2,971	14,976
GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, Appendix C	1,991	2,133	2,285	2,444	2,533	2,626	14,011

The electricity expenditure forecast from GAWB's consultant's report is in real FY2015$. The electricity expenditure forecast submitted by GAWB in its submission to the QCA is in nominal $ terms based on a 2.5% inflation rate. Adjusting for this difference, the electricity cost forecast from the various documents submitted by GAWB is consistent.

N.3 Documentation reviewed

The key reference documents used for this review are:

- GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, September 2014
- GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
- 9 EDOCS_n109316_v2_J869_ERM_Power_Retail_Pty_Ltd_Retail_Electricity_Agreement.pdf
- O6.1 Electricity summary - includes historical costs and forecast.pdf
- O6.2 Electricity forecast detail.xlsx
- O6.3 Electricity forecast detail for ADPS, GWTP and YWTP.xlsx
- Various emails from GAWB re energy usage

N.4 Prudency

Electricity is used at the Gladstone and Yarwun Water Treatment Plants for the treatment and pumping of water. Electricity is also used at Awoonga Dam for pumping and at various other pump stations. The utilisation of electricity is critical to ensuring the supply security of water and in the water treatment process.

Given the criticality of electricity for security of supply and the water treatment process, we find this expenditure to be prudent.

N.5 Efficiency

In this section we determine if the expenditure is efficient or not efficient.

N.5.1 Calculation of costs

GAWB has based its electricity cost forecast on its actual electricity cost across its various sites. The impact of carbon tax is removed from the annual cost. This is shown in Table N.4.

Table N.4: Operation – Electricity cost calculations

	Gross Amount	less Carbon tax	Net Amount
Tariff Sites			
Poonyahra Cray Ponds*	$143		$143
28 Lord St (Hatchery)	$55,740		$55,740
Benaraby Booster Pump Station	$9,861		$9,861
Golegumma Reservoir	$2,095		$2,095
BSL TW Flowmeter, Hadley Dr	$515		$515
Boyne Island Reservoir	$382		$382
Calliope Booster Pump Station	$15,095		$15,095
Boat Creek Pump Station	$406		$406
East End Reservoir	$10,410		$10,410
Fisherman's Road	$602		$602
Transpacific Connection	$405		$405
QER Connection	$292		$292
Cement Aust. Fire Connection	$294		$294
Cement Aust. Connection	$291		$291
South Gladstone Reservoir	$300		$300
Glenlyon Road	$437		$437
Hanson Rd FM at Fitz St	$392		$392
Lot 69 Hanson Road, Gladstone	$7,469		$7,469
Water Recorder QAL Access	$688		$688
Glen Eden TW Booster	$1,087		$1,087
Toolooa Chlorinator	$437		$437
Fitzsimmons Street Reservoir	$5,414		$5,414
Total tariff sites	$112,755		$112,755
Contestable sites[31]			
Awoonga Dam Pump Station	$1,357,449	-$98,879	$1,258,570
Toolooa Reservoir	$445		$445
Toolooa Booster Pump Station	$4,860		$4,860
Gladstone WTP	$516,139	-$38,840	$477,299

[31] The corporate head office at Goondoon St, Gladstone is also a contestable site. Electricity use at the corporate head office is accounted for under the Corporate Services function and is outside the scope of this review.

	Gross Amount	less Carbon tax	Net Amount
Yarwun WTP	$144,120	-$8,577	$135,543
Mt Miller Reservoir	$1,096		$1,096
Total contestable sites	**$2,024,109**	**-$146,297**	**$1,877,812**
Total electricity cost	**$2,136,864**	**-$146,297**	**$1,990,567**

N.5.2 Delivery of service

Electricity is purchased from electricity retailers at four contestable sites; Awoonga Dam, Gladstone Water Treatment Plant (WTP), Yarwun WTP and at the Goondoon St office. The electricity retailer at these sites is ERM Power Retail.

At other franchise sites, Ergon Energy as the local franchise retailer supplies electricity to the various GAWB facilities.

N.5.3 Market conditions

The contestable market for electricity is competitive and GAWB is able to seek competing tenders for this service for its contestable sites. For the other sites, the local franchise retailer Ergon Energy supplies electricity based on approved tariffs.

Recent history has seen electricity prices in Queensland increase substantially due to increases in network tariffs as well as the introduction of the Carbon Tax. The Carbon Tax has since been repealed while measures to restrain demand growth is likely to lead to lower network capacity investments and thus slower increases in network prices. However, there still exists some uncertainty due to the transition to fully cost reflective franchise tariffs and the continuing transition to contestable market contracts. Certain tariffs are due to become obsolete by the end of 2014-15 while most of the others are due to be obsolete by mid-2020. These tariffs are currently subsidised and when they become obsolete, connections currently supplied under these tariffs will convert to either cost reflective tariffs or transfer to a market based retail contract. The Queensland Government has also flagged that reforms will be applied to the Queensland electricity sector over the medium to long term.

N.5.4 Efficiencies and economies of scale

GAWB is a price-taker in relation to the cost of electricity. It does not have the scale to effectively negotiate prices for the electricity it consumes. GAWB may be able to seek to better manage its pumping requirements to more efficiently manage its peak demand and so reduce the demand charge it faces.

GAWB has identified that potential of improved efficiency in its pumping operations will enable it to save over $129,000 in total between 2017 and 2020. GAWB also indicates that it is not forecasting any increases in electricity consumption. Should demand for water increase, any increases in electricity costs will be absorbed by efficiencies.

N.5.5 Benchmarking

Electricity is the second largest component of operating expenditure. As part of its submission, GAWB provided a report[32] by Marchment Hill Consulting (MHC) who was engaged by GAWB to conduct an independent Operational Benchmarking Study to provide a view of GAWB's opex efficiency relative to a set of comparable peer organisations in the Australian water sector focusing on operational expenditure. MHC found that GAWB's efficiency ratios are consistently superior to the peer group. In terms of the operating efficiency ratios, GAWB ranked best among its peers and compares favourably to the larger bulk supply entities in the peer group.

[32] Marchment Hill Consulting, *Gladstone Area Water Board, Operational Benchmarking*, 11 July 2014

GAWB's operating efficiency is also consistently superior to the other small regional integrated and bulk water entities. Having reviewed the MHC report, we see no reason to disagree with their conclusion that GAWB is operating within industry norms and may in fact be at the forefront of operating costs among its peers.

Given that electricity expenditure form an integral part of the operating expenses of all water utilities and that MHC is a respected and reputable consultant in the water industry and that, from our review of MHC's report, we concur with MHC's conclusions, we are of the opinion that GAWB's electricity expenditure is within industry norms.

N.6 Trade-offs with capex

The refurbishment of the pump station and re-configuration of the pumps at the Gladstone WTP will enable GAWB better control the operations of the pumps and thus better manage the cost of electricity.

The development of the off-line storage at Toolooa would allow the pumps at the Awoonga Dam Pump Station (ADPS) be used during the off peak periods.

N.7 Policies and procedures

Approximately 95% of the total electricity costs are attributed to four specific sites. These sites are the ADPS (where the water is sourced from Lake Awoonga), Gladstone WTP (where approximately 90% of the total treated water is processed), Yarwun WTP (where the remaining 10% of the total treated water is processed) and the Goondoon St Administration Office. These sites are contestable and GAWB utilises the services of a broker to purchase electricity.

The broker obtains multiple comparative proposals for electricity from various vendors and presents at least two options for GAWB to consider. The broker also recommends the contract period for GAWB to enter into, based on the nature of the electricity market at the time of obtaining the proposals. While it was usual practice to contract for 24 months, the 2013 contract was struck for a period of just 12 months because it was anticipated that the Carbon Tax would be repealed during the contract period.

The total contract costs for the lowest price vendor are presented to the Board of Directors for approval to enter into a contract. Once approved the broker arranges for the execution of contracts between GAWB and the successful vendor.

The Broker is not paid a fee by GAWB.

The remaining sites that make up approximately 5% of GAWB's total electricity cost are standard supply arrangements with the local electricity retailer, Ergon Energy based on tariffs. These tariffs are generally not cost reflective and thus consistently lower for than their respective contestable market prices.

In our opinion, the procedure applied by GAWB in sourcing the electricity required for its operations is appropriate and should enable GAWB procure electricity at prevailing market rates.

N.8 Assessment of reported expenditure

GAWB has developed its forecast of electricity expenditure based on historical cost of electricity and a reduction due to the repeal of the carbon tax. Our review based on the actual electricity use of 2009 to 2013, shows that historical electricity usage over this four year period averaged around 11.3 GWh. Peak usage accounted for 34% of energy consumed.

In its forecast, GAWB has projected that annual energy consumption would reflect the 12 month period from November 2012. This has resulted in forecast average consumption increasing to 12.5 GWh with a peak usage of 51%.

Table N.5: Historical and forecast use of electricity (MWh)

MWh	Awoonga DPS			GWTP			YWTP			Total		
	Peak	Off peak	Total	Peak	Off peak	Total	Peak	Off peak	Total	Peak	Off peak	Total
2009/10	2,019	6,001	8,019	1,337	1,577	2,914	275	306	582	3,631	7,884	11,515
2010/11	1,070	6,053	7,123	1,241	1,219	2,460	314	352	666	2,624	7,624	10,248
2011/12	2,332	5,602	7,934	1,260	1,421	2,681	371	421	793	3,964	7,444	11,407
2012/13	3,243	5,039	8,282	1,416	1,500	2,916	357	404	760	5,016	6,943	11,958
Average	2,166	5,674	7,840	1,313	1,429	2,743	329	371	700	3,809	7,474	11,282
% of total	28%	72%		48%	52%		47%	53%		34%	66%	
Forecast	4,481	4,086	8,567	1,512	1,634	3,146	376	433	809	6,368	6,153	12,522
Forecast % of total	52%	48%		48%	52%		46%	54%		51%	49%	

The main reason for the increase in consumption is the additional demand from Rio Tinto which more than doubled the overall requirement for raw water from circa 320,000 kl per month to circa 850,000 kl per month. Also, the peak usage between October and February reflects the use of the 3rd pump at Awoonga Dam pump station. This pump is required only as an alternative when either of the main two pumps was offline due to maintenance. Pump 3 is not as energy efficient as pumps 1 and 2.

GAWB also advised that it understood that the demand for potable water has and is increasing. Demand for water from Gladstone Regional Council has increased by 5.6% during 2014 and is expected to continue increasing over the next regulatory period. Over the past four years (2010-2014), raw water demand has increased at a compounded annual rate of 6.9% while potable water demand increased by 4.9% p.a. This is shown in Table N.6.

Table N.6: Water demand vs electricity usage

	2010	2011	2012	2013	2014	CAGR
Water demand						
Raw	17,311	16,515	18,627	21,069	22,587	6.9%
Potable	10,324	9,217	11,150	11,440	12,506	4.9%
Total	27,635	25,732	29,777	32,509	35,093	6.2%
Electricity usage						
ADPS	8,019	7,123	7,934	8,282	8,567	1.7%
GWTP	2,914	2,460	2,681	2,916	3,146	1.9%
YWTP	582	666	793	760	809	8.6%
Total	11,515	10,248	11,407	11,958	12,522	2.1%

The energy demand, arising from these three major facilities, increased by about 2.1% pa over the same period. Peak demand however is increasing at 15% p.a. while off peak demand has fallen. The main reason for the increasing use of peak energy is the change in operating regime of the pumps at ADPS.

Historically, GAWB avoided peak energy periods for the pumping of water to fill reservoirs. With off peak pumping, off peak energy consumption comprise 72% of total energy used. This practice ceased when GAWB recognised that low reservoirs levels at the end of the day meant that there exist limited risk storage. As a result, the pumps at ADPS were operated mainly during the day (peak periods) to ensure that the reservoirs were constantly filled so that should the pumps fail overnight, at least the following day's supply could be

assured and provide time for repair work to be done on the pumps. As a result, off peak usage of electricity fell to 48%. Consequently, the cost of electricity rose reflecting the higher peak energy usage.

The development of the off-line storage between Awoonga Dam and Toolooa Reservoir would provide approximately 14 days' supply and will maintain customer supply in the event of a failure of ADPS. This will allow more off peak pumping instead of peak pumping. In our opinion, this is considered appropriate and is hence recommended as pumping during off peak periods will lead to lower costs. The pumping regimes at Gladstone and Yarwun WTP did not change significantly with off peak usage remaining at around 52% and 53% respectively.

Given these considerations, we find that under the current operating constraints that GAWB faces, the usage of electricity is efficient. However, we consider that forecast cost increases are inefficient as the escalation applied by GAWB is not in keeping with recent regulatory trends. We also note that when the off line storage facility is available and refurbishment and re-configuration of the pumps at Gladstone Water Treatment Plant is completed, GAWB will have the opportunity to revamp the operating protocol and conduct more pumping during off peak periods thereby lowering the cost of electricity. Some of this potential efficiency has been noted by GAWB but has not been factored into its proposed costs for 2017 onwards. We recommend including this efficiency in the cost projection as it can be readily exploited once the capital works are completed. We do acknowledge that the greatest potential efficiency will come from the development of the off-line storage which would however not available during the next regulatory period. However, whilst we have found that the base year usage is efficient, the cost is based on charges that apply in 2013/14.

Although we accept that GAWB's electricity prices obtained in 2013/14 were market based, drawing on current electricity market information, we consider that electricity costs for 2014/15 have retreated from the levels of 2013/14. Should GAWB's contestable sites remain un-contracted for calendar years beyond 2015, and hence remain exposed to wholesale electricity market movements, we consider that reasonable risk management measures should be implemented to limit adverse market movements to within 5% of nearer dated forward contract periods and within 10% of latter dated forward contract periods (within the GAWB assessment period). As a consequence, our estimate for contestable market costs for FY15 (less carbon) is $1.78 million. Assuming that tariff sites account for 5% of total electricity cost, we recommend that the base year total electricity cost for GAWB be set at $1.87 million. The build-up of electricity base year cost is shown in Table N.7.

Table N.7 : Electricity expenditure base year cost build up

For all Contestable Sites	Jan 2014 - Jul 2014	Jul - Dec 2014	Jan - Jul 2015
Black energy	$376,740	$302,329	$309,800
LGCs	$23,188	$23,188	$26,479
STCs	$24,582	$24,582	$30,323
DUOS	$421,238	$421,238	$421,238
TUOS	$102,308	$102,308	$102,308
Market fees	$4,627	$4,627	$4,627
Metering fees	$3,183	$3,183	$3,183
Total Cost	$955,865	$881,454	$897,958
Regulated Pricing Sites FY15 (5% of total costs for FY 15)			$93,653
Total FY15 Spend			$1,873,065

Jacobs determined efficient expenditure for electricity is shown in Table N.8.

Table N.8: Jacobs determined efficient electricity expenditure

	Base year	2016	2017	2018	2019	2020
Determined efficient expenditure ($'000)	1,873	2,198	2,263	2,381	2,462	2,548

N.9 Extrapolation to other projects

Whilst the use of electricity is critical to the operations of GAWB and GAWB has the ability to control when electricity is used for pumping, GAWB's primary concern is water supply security. The cost of electricity is secondary to this concern. We thus do not recommend extrapolating the findings of this operating expenditure item to other cost areas.

N.10 Summary, conclusion and recommendation

The expenditure is assessed as prudent as the requirement for the use of electricity has been demonstrated. Electricity is required to pump bulk water to the reservoirs as well as from the WTPs to the customers' connection points. It is also used during the treatment of water. The volume of energy used is dependent on demand for water.

The expenditure is assessed as efficient under the current operating constraints. Based on current electricity market information, we are of the opinion that electricity costs for 2014/15 has retreated from the high levels of 2013/14 and thus base year costs can be expected to be lower than that incurred in 2013/14 (after taking into consideration the repeal of the Carbon Pricing Mechanism). We also expect that efficiencies in the use and cost of electricity can readily be achieved once the operating constraints that GAWB faces are relaxed by various capital works initiatives.

N.10.1 Summary

Table N.9 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table N.9: Summary of prudency and efficiency

Expenditure	Assessment	Outcome	Summary
Electricity expenditure	Prudency		Electricity is required for the pumping and treatment of water and the volume of energy used are dependent on demand for water.
	Efficiency		The expenditure is assessed as partially efficient under the current operating constraints as we consider that the escalators applied by GAWB are inconsistent with recent AER draft determinations and Ergon Energy's pricing submission to the AER. We also expect that risk management measures could be implemented to limit adverse electricity market price movements which will lead to lower electricity prices in base year prices as well as prices in subsequent years. We further expect that efficiencies in the use and cost of electricity can readily be achieved once the operating constraints that GAWB faces are relaxed by various capital works initiatives e.g. installation of VFDs limiting peak demand charges and installation of higher pumping capacity at GWTP allowing greater off-peak pumping.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

N.10.2 Recommendations

What we consider are the efficient costs for electricity are as shown in Table N.10.

Table N.10: Jacobs determined efficient electricity expenditure

	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Electricity expenditure	2,198	2,263	2,381	2,462	2,548

Appendix O. Opex – chemicals, operations

O.1 Executive summary

Table O.1 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table O.1: Summary of prudency and efficiency

Expenditure	Assessment	Outcome	Summary
Chemical expenditure	Prudency		Chemicals are required in the treatment of water and the quantity used is dependent on demand and the quality of the raw water.
	Efficiency		Whilst the forecast usage levels of chemicals are higher than average historical usage levels, the forecast usage is below peak usage. The higher than average forecast will provide a margin in the event that chemical usage increases due to a deterioration in source water quality.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

O.2 Overview of opex

The cost of chemicals has been identified as a key component of GAWB's cost of operations. It is used in the storage, delivery, treatment and fish hatchery (supporting storage) activities. The demand for chemicals is largely related to total volume of water supplied.

The common bulks chemicals that are utilised by GAWB are:

- Sodium Hypochlorite
- Sodium Fluorosilicate
- Sodium Fluoride
- Aluminium Sulphate
- Soda Ash
- Polyelectrolyte
- Powdered Activated Carbon

Table O.2 provides the actual expenditure on chemicals between 2010 and 2015.

Table O.2: Operations– Actual chemical opex[33]

Operations chemical costs	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	Average
Actual chemical cost (real 2015$) ($'000)	610	688	786	$750	$808	$728
Annual increase		12.9%	14.2%	-4.6%	7.7%	
Actual chemical cost (nominal $) ($'000)	556	640	746	732	808	

[33] GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, Appendix C

Operations chemical costs	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	Average
Annual increase		15.1%	16.5%	-1.9%	10.4%	
QCA 2010 chemical allowance (nominal $) ($'000)	847	885	925	967	1,011	

Chemical costs increased in the 2014/15 period due to recent increases in the cost of Sodium Hypochlorite. The increase in 2012/13 was due to high chemical usage as a result of ex-tropical cyclone Oswald causing heavy rain and floods in Gladstone in January 2013 resulting in significantly higher water treatment costs over the first few months of 2013. Nevertheless, we also note that GAWB has underspent the allowance provided by the QCA in its 2010 price review for the 2010/11 to 2014/15 regulatory period.

Over the forecast period, GAWB has assumed that the cost of chemicals remains constant in real terms.

Table O.3 shows the proposed cost of chemicals within the 2015 to 2020 budget.

Table O.3: ALCM – Chemicals proposed opex

Source	2014-2015 ($'000)	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)	Total
GAWB, *2015 Price Monitoring Investigation Submission to the Queensland Competition Authority*, September 2014, Table 16, page 21	808	828	849	870	892	914	5161
GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, Appendix C	807.7	807.7	807.7	807.7	807.7	807.7	4,845.4
O7.1 Chemicals summary - includes historical costs and forecast.pdf	807.7	807.7	807.7	807.7	807.7	807.7	4,845.4

The chemical expenditure forecast from GAWB's consultant's report corresponds to the "O7.1 Chemicals summary - includes historical costs and forecast" PDF document provided by GAWB. These are in real FY2015$. The chemical expenditure forecast submitted by GAWB in its submission to the QCA is in nominal $ terms based on a 2.5% inflation rate. Adjusting for this difference, the chemical cost forecast from the various documents submitted by GAWB is consistent.

O.3 Documentation reviewed

The key reference documents used for this review are:

- GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, September 2014
- GHD, *Report for Gladstone Area Water Board - Review of Operations and Asset Life Cycle Management Expenditure for GAWB's 2015 Price Review*, September 2014
- O7.1 Chemicals summary - includes historical costs and forecast.pdf
- O7.2 Chemicals forecast detail.xlsx
- O7.3 Chemicals purchase history.xlsx
- O7.4 Price forecast for sodium hypo.pdf
- 6 Summary of chemicals consumption.xlsx
- 7b.1 EDOCS_n284604_v1_J1243_Orica_Sodium_Hypochlorite_Chemical_Contract.pdf

- 7b.2 EDOCS_n284642_v1_J1244_Orica_Chemical_Contract_for_Sodium_Fluoride_and_Sodium_Fluorosilicate.pdf
- 7b.4 Orica Chemical Extension letter for_Sodium_Fluoride_and_Sodium_Fluorosilicate (sent to Orica).pdf
- 7b.6 FW Supply and Delivery of Soda Ash and Aluminium Sulphate.pdf
- 7b.7 Omega Chemicals extension letter (sent to Omega).pdf

O.4 Prudency

Chemicals are used at the Gladstone and Yarwun Water Treatment Plants. The application of these chemicals is critical to the water treatment process.

- Sodium Hypochlorite - used as a disinfectant or a bleaching agent. Added to chlorinate water so as to inactivate pathogens
- Sodium Fluorosilicate and Sodium Fluoride – added to water to promote dental health
- Aluminium Sulphate - causes microscopic impurities to clump together into larger particles which settles in the tank or becomes large enough to be filtered out of the water. A clarifying agent to reduce the cloudiness of water
- Soda Ash – Sodium carbonate, used to neutralise the pH of acidic water
- Powdered Activated Carbon (PAC) – a pre-treatment that removes toxins by adsorbing Cyanobacterial metabolite and other natural organic compounds, taste and odour compounds, and synthetic organic chemicals
- Polyelectrolyte – a coagulant aid and filter aid used to remove sediment from water

Given the criticality of chemicals to the water treatment process, we find this expenditure to be prudent.

O.5 Efficiency

In this section we determine if the expenditure is efficient or not efficient.

O.5.1 Calculation of costs

Costs are calculated by a bottom-up build of chemical quantities based on historical usage. While the consumption of chemicals is seen as a function of water demand, GAWB stated that the forecast costs have not been adjusted for demand as they are seen not to have a material impact and GAWB indicated that it will absorb any increases as efficiency improvements.

O.5.2 Delivery of service

Chemicals are purchased in bulk from external suppliers.

O.5.3 Market conditions

GAWB has limited control over its chemical expenditure. The cost of chemicals is largely driven by the worldwide demand for chemicals and supplier capacities.

O.5.4 Efficiencies and economies of scale

The volume of chemicals required is largely driven by demand, the quality of the source water and operational requirements. External factors such as regulatory requirements including provisions of the Australian Drinking Water Guidelines and the requirement to introduce fluoridation for dental health reasons determine the usage of certain chemicals.

While GAWB has not specifically identified any efficiency gains or if economies of scale are achievable, it is stated in GAWB's submission that it is not forecasting any increases in cost should demand for water increase and any increases in costs will be absorbed by efficiencies.

It may also be possible for greater economies of scale to be achieved by combining the purchase of required chemicals with other parties in Gladstone. These other parties could include some of its customers who take raw water and may be treating the water themselves to some extent. Also Gladstone Regional Council undertakes wastewater treatment which may use chemicals that are in common with GAWB. Joint purchasing of such chemicals may achieve lower purchase costs to the benefit of both parties. Such arrangements have been known to achieve savings in other regions in Australia and elsewhere. However, Jacobs accepts that discussions with these other parties and analysis of commonality of chemical usage, if any, needs to take place before any efficiency savings from this initiative, if any, can be quantified.

O.5.5 Benchmarking

As part of its submission, GAWB provided a report[34] by Marchment Hill Consulting (MHC) who was engaged by GAWB to conduct an independent Operational Benchmarking Study to provide a view of GAWB's opex efficiency relative to a set of comparable peer organisations in the Australian water sector focusing on operational expenditure. MHC found that GAWB's efficiency ratios are consistently superior to the peer group. In terms of the operating efficiency ratios, GAWB ranked best among its peers and compares favourably to the larger bulk supply entities in the peer group. GAWB's operating efficiency is also consistently superior to the other small regional integrated and bulk water entities. Having reviewed the MHC report, we see no reason to disagree with their conclusion that GAWB is operating within industry norms and may in fact be at the forefront of operating costs among its peers.

Given that chemical expenditure form an integral part of the operating expenses of all water utilities and that MHC is a respected and reputable consultant in the water industry and that, from our review of MHC's report, we concur with MHC's conclusions, we are of the opinion that GAWB's chemical expenditure is within industry norms.

O.6 Trade-offs with capex

There are no trade-offs with capex for this opex item.

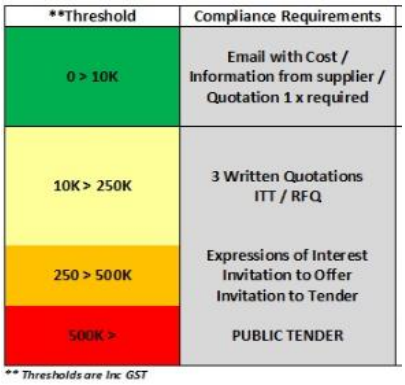
O.7 Policies and procedures

GAWB states that the procurement of chemicals is in accordance with the GAWB procurement thresholds under supply agreements or contractor agreements. These agreements are issued by invitation to selected specialised suppliers under GAWB's standard request for quotation process.

- For supply contracts under $10,000, one quote is obtained with costs and other information provided by the supplier in an email
- For supply contracts greater than $10,000 but under $250,000, 3 written quotes are obtained via an invitation to tender or a request for quotation
- For supply contracts between $250,000 and $500,000, expressions of interest, invitations to offer or invitations to tender are issued
- For contracts greater than $500,000 a public tender is held

[34] Marchment Hill Consulting, *Gladstone Area Water Board, Operational Benchmarking*, 11 July 2014

Figure O.1: GAWB Procurement Thresholds



GAWB applies a simple procurement process. While it provides guidance on thresholds and the number of quotations required to be obtained for certain thresholds, it does not stipulate who has the authority to determine the preferred bidder and the basis of the decision. Further, for the $250,000 to $500,000 threshold, the process does not specify how many invitations for tender are to be issued. How the public tender for supply contracts above $500,000 is also not defined e.g. which publications will the used to announce the public tender or the minimum period the public tender will be open. We recommend that GAWB conducts a review of its procurement policy and operational expenditure governance processes with a view to making them more robust and in keeping with industry good practice.

O.8 Assessment of reported expenditure

GAWB has developed its forecast of chemical expenditure based on historical use of chemicals and the expected cost of purchasing these chemicals. In our review, based on the actual chemical use from 2011 to 2015, GAWB has forecast a usage of most chemicals greater than the average consumed historically (with the exception of powdered activated carbon). However, the forecast is in our view not excessive as it is within the historical consumption variability. The greatest difference of 24% between the forecast usage volume and the average historical consumption is for polyelectrolyte. That said, historically, the consumption of this chemical peaked at 39% above the historical average. For the other chemicals, usage is less variable. Over the five years of actual usage data we obtained, peak usage was around 20% greater than average except for powdered activated carbon where peak usage was 60% higher than the average

For all chemicals, GAWB has forecast usage below peak usage levels with the exception of aluminium sulphate. However, the excess is not material. Given the variability of usage, the higher than average forecast usage for most chemicals will in our opinion provide a margin in the event of significant deterioration in source water quality given recent experience when heavy rains and floods in 2013 led to significantly higher levels of chemical consumption in 2012/13 and 2013/14. Table O.4 below shows the analysis for the chemical expenditure. In our opinion, the forecast usage of chemicals is reasonable and we find that the base year cost efficient.

Table O.4: Assessment of base year chemical expenditure

Chemical usage	Polyelec-trolyte	Alum Sulphate	Sodium Hypo-chlorite	Fluoride	Soda Ash	Activated Carbon	Total Cost
GWTP	kg	tonne	l	kg	tonne	kg	
2010/11	977	912	306,909	7,199	122	7,095	
2011/12	1,502	757	316,597	9,688	139	3,410	
2012/13	2,112	1,264	437,628	7,503	132	2	

Chemical usage	Polyelec-trolyte	Alum Sulphate	Sodium Hypo-chlorite	Fluoride	Soda Ash	Activated Carbon	Total Cost
GWTP	kg	tonne	l	kg	tonne	kg	
2013/14	1,565	1,334	423,928	8,402	108	5,800	
2014/15[35]	1,206	1,130	390,212	10,384	39	2,212	
YWTP							
2010/11	34	86	40,547	390	14	327	
2011/12	128	175	73,512	2,300	20	495	
2012/13	216	222	77,509	2,775	44	135	
2013/14	175	155	68,904	1,475	25	1,365	
2014/15[35]	174	125	61,985	899	8	-	
Combined							
2010/11	1,010	998	347,456	7,589	136	7,422	
2011/12	1,630	931	390,109	11,988	159	3,905	
2012/13	2,328	1,486	515,137	10,278	176	137	
2013/14	1,740	1,489	492,832	9,877	133	7,165	
2014/15	1,380	1,255	452,197	11,283	47	2,212	
Average Annual volumes	1,677	1,226	436,384	9,933	151	4,657	
GAWB's forecast volumes	2,085	1,500	451,500	11,500	160	4,600	
Estimated cost per unit	$8.25	$260	$0.55	$1.67	$730	$2.95	
Total cost	$17,201	$390,000	$248,325	$19,205	$116,800	$13,570	$805,101
Other chemical costs							$5,511
Total proposed chemical cost							$807,737

Based on the base year chemical cost of $807,737, we recommend the revised chemical expenditure forecast shown in Table O.5. GAWB has applied a 2.5% p.a. inflation rate to their base 2015 chemical costs. In our review of costs escalators, we have found that 2.7% p.a. is an appropriate rate to apply for chemical cost and the forecast expenditure shown in Table O.5 reflects this escalation. In comments on our draft report GAWB indicated that it has updated the proposed escalation rate to 2.7% from 2016, adding approximately $15,000 to the proposed expenditure. The revised proposed escalation rate is consistent with our recommended escalation rate.

Table O.5: Jacobs' determined efficient chemical expenditure opex

	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Chemical expenditure	827	849	872	896	920

[35] Annualised from 132 days usage in 2014.

O.9 Extrapolation to other projects

Whilst the use of chemicals is critical to the operations of GAWB, the ability to control the volumes used and unit cost is limited. We thus do not recommend extrapolating the findings of this operating expenditure item to other cost areas.

O.10 Summary, conclusion and recommendation

The expenditure is assessed as prudent as the requirement for the use of chemicals has been demonstrated. Chemicals are required in the treatment of water and the quantity used is dependent on demand and the quality of the raw water.

We have some concerns regarding their procurement procedure and recommend that it be made more robust by specifying the appropriate decision maker and the number of invitations for quotations to be sent out or number of quotes expected at various thresholds.

Whilst the forecast usage levels of chemicals are higher than average historical usage levels, the forecast usage is below peak usage. The higher than average forecast will provide a margin in the event that chemical usage increases due to a deterioration in source water quality.

O.10.1 Summary

Table O.6 presents an overview of the findings of the prudency and efficiency of the expenditure.

Table O.6: Summary of prudency and efficiency

Expenditure	Assessment	Outcome	Summary
Chemical expenditure	Prudency		Chemicals are required in the treatment of water and the quantity used is dependent on demand and the quality of the raw water.
	Efficiency		Whilst the forecast usage levels of chemicals are higher than average historical usage levels, the forecast usage is below peak usage. The higher than average forecast will provide a margin in the event that chemical usage increases due to a deterioration in source water quality.

Where:

- Green indicates that the assessment criteria have been fully met (i.e. the expenditure is prudent/efficient)
- Yellow indicates that the assessment criteria have been partially met (i.e. the expenditure does not fully met all criteria associated with prudency/efficiency)
- Red indicates that the assessment criteria have not been met (i.e. the expenditure is not prudent/efficient)

O.10.2 Recommendations

We recommend the revised expenditure for chemicals shown in Table O.7.

Table O.7: Jacobs' determined efficient chemical expenditure

	2015-2016 ($'000)	2016-2017 ($'000)	2017-2018 ($'000)	2018-2019 ($'000)	2019-2020 ($'000)
Jacobs' determined efficient chemical expenditure	827	849	872	896	920

Appendix P. Cost escalation review

P.1 Executive summary

The Queensland Competition Authority (QCA) engaged Jacobs to review Gladstone Area Water Board's (GAWB's) proposed cost escalation rates as part of the GAWB Price Monitoring Investigation 2016-20.

Our review examined the rates proposed by GAWB for appropriateness. Where alternative escalation rates were available and likely to be more appropriate, these are recommended. Table P.1 summarises GAWB's proposed rates and our recommended rates. All years are financial years unless otherwise stated (e.g. 2016 means FY2015-16).

Table P.1: Comparison of GAWB's proposed and Jacobs' recommended escalation rates

Cost category	GAWB proposal	Jacobs recommendation	Change
Staffing costs	2016: 3.29% 2017: 3.13% 2018: 3.38% 2019: 3.61% 2020: 3.97% (Average: 3.5%)	2016: 3.3% 2017: 3.5% 2018: 3.5% 2019: 3.8% 2020: 3.8% (Average: 3.6%)	↔ ↑ ↑ ↑ ↓
Electricity	2016: 9.83% 2017: 9.82% 2018: 9.60% 2019: 6.25% 2020: 6.25% (Average: 8.4%)	2016: 3.5% 2017: 6.1% 2018: 4.2% 2019: 4.2% 2020: 4.2% [Average: 4.4%]	↓ ↓ ↓ ↓ ↓
Maintenance	2.5%	2.6%	↑
Chemicals	2.5%	2.7%	↑
Other expenditure	2.5%	2.5%	↔
Professional services	3.4%	1.8%	↓
Insurance	2016: 5.0% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 5.0%)	2016: 2.5% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 4.5%)	↓ ↔ ↔ ↔ ↔
Regulatory fees	5.8%	Not proposed*	**n.a.**
Council rates	2.6%	5.0%	↑
All Capex items	2.5%	CPI[36]	↔

Note: * The purpose of the regulatory fees is to recover fixed regulatory costs, incurred predominantly by the QCA in 2015. This is more akin to an annuity. Therefore, we consider as reasonable any approach that recovers the efficient regulatory costs, in real terms, over the regulatory period.

[36] Whilst we refer to CPI as being the escalation rate, the technically accurate description is 'percentage changes in the CPI'. We have adopted the term 'CPI' instead of 'percentage changes in the CPI' for brevity.

As an example of how to use this report, the escalation rate for GAWB's staffing costs in 2016 (first row of Table P.1) represents the escalation rate applied to staffing costs in 2015 to obtain the staffing-costs in 2016.

P.1.1 Impact of key findings

For the largest cost category of staffing costs, which represents 47% of GAWB's proposed total opex during 2016-20, our slightly higher recommended escalation rates (on average) will not have a material impact over the regulatory period.

For the second largest cost category of electricity costs, which represents 10.8% of GAWB's proposed total opex during 2016-20, our lower recommended escalation rates (on average) may have a material impact on total electricity costs over the regulatory period. However, we consider that there are electricity cost savings available to GAWB in the market and that it would be in the best interests of GAWB and its customers for GAWB to pursue those opportunities.

We have recommended minor increases to the escalation rates for maintenance, chemicals and council rates, which will result in immaterially higher opex in those categories, ceteris paribus, than GAWB has proposed.

On the other hand, we have recommended decreases to the escalation rates for professional services and insurance costs, which will result in immaterially lower opex in those categories, ceteris paribus, than GAWB has proposed.

Overall, GAWB's escalation rates are reasonable. Our differences generally relate to more up-to-date data being available to us at the time we prepared this report (i.e. GAWB prepared its submissions some months earlier than our report) or a difference of economic opinion in an area of uncertainty. In some cases GAWB has proposed to follow regulatory precedent, where we have examined the situation more broadly. Whilst our analysis has led us to recommend alternative rates, on the basis that they are more likely to be appropriate, we consider that GAWB's proposed rates were put forward in good faith. We have found no evidence to suggest that GAWB was seeking to exercise monopoly power.

We consider that GAWB has appropriately applied its recommended escalation rates in its budget spreadsheets. However, it is outside our scope to review the application of escalation rates within the GAWB pricing model.

P.2 Introduction

The Queensland Competition Authority (QCA) is monitoring the prices proposed by GAWB for the period 2015-16 to 2019-20 (2016-2020). The QCA has engaged Jacobs to review GAWB's proposed capital and operating expenditure, including its proposed rates for escalating costs over the five-year period.

Cost escalation is the focus of this chapter.

Our approach to each expenditure category has been to review the escalation rates proposed by GAWB and note any potential issues associated with the proposed rates and factors likely to affect those rates. Then, where possible, we recommend the most appropriate rates and comment on the materiality.

All years are financial years unless otherwise stated. The base forecasting year is 2014-15, and all escalation rates are relative to the previous year (i.e. 2016 financial year estimates are obtained by multiplying 2015 budget values by the 2016 escalation rate). All values are stated in nominal terms.

P.3 GAWB proposed escalation rates for operating expenditure

The escalation rates at the time of writing proposed by GAWB are shown in Table P.2, alongside the escalation rates approved by the QCA for 2011-15. For the period 2021 to 2035, GAWB has proposed to adopt the consumer price index (CPI[37]) as the escalation rate for operating expenditure.

Table P.2: GAWB escalation rates by cost category

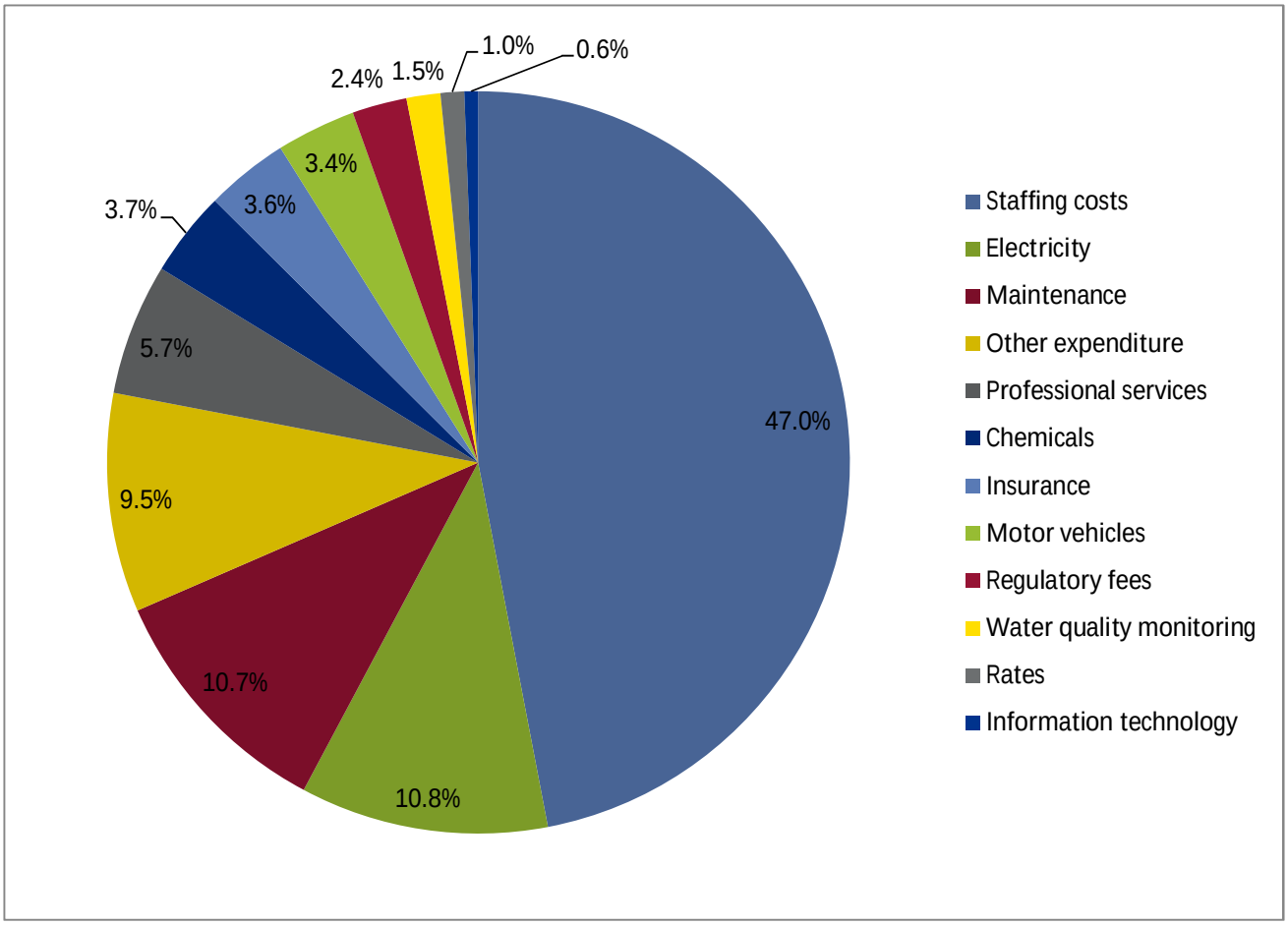
Cost category	Approved rates 2011-2015	GAWB proposed rates for 2016-2020	Source for 2016-2020 rates
Staffing costs	5%	2016: 3.29% 2017: 3.13% 2018: 3.38% 2019: 3.61% 2020: 3.97%	Estimate of likely remuneration movements provided by Mercer
Electricity	Under contract: Energy charges at contract value; network costs at 8%. Without contract: 8%	2016: 9.83% 2017: 9.82% 2018: 9.60% 2019: 6.25% 2020: 6.25%	Forward estimate provided by Wedgewood White Ltd
Maintenance	2.43% (CPI)	2.5%	Midpoint of Reserve Bank of Australia's (RBA) target inflation band
Chemicals	2.43% (CPI)	2.5%	Midpoint of RBA's target inflation band
Other costs	2.43% (CPI)	2.5%	Midpoint of RBA's target inflation band
Professional services	4.63%	3.4%	3 year historic average of Professional, scientific and technical services WPI
Insurance	5% for 3 years, CPI thereafter	5%	Estimate provided by Marsh insurance brokers
Regulatory fees	2.43% (CPI)	5.8%	Past actuals from QCA
Council rates	5.3%	2.6%	Local Government Association of Queensland (LGAQ) - Council Cost Index

P.4 GAWB total operating expenditure – materiality of costs

We have examined the key categories of expenditure which will make up GAWB's proposed operating expenditure (opex) between 2016 and 2020. Figure P.1 illustrates the proportion of total opex over the period for each category. Any proposed changes to escalation rates for those categories which represent a larger proportion of total expenditure will have, all else being equal, more material cost impacts for GAWB than for those that represent a smaller proportion of total expenditure.

[37] While we refer to CPI as being the escalation rate, the technically accurate description is 'percentage changes in the CPI'. We have adopted the term 'CPI' instead of 'percentage changes in the CPI' for brevity.

Figure P.1: GAWB total opex, 2016-2020



The largest cost category is staffing costs (47% of total opex over 5 years). Electricity (10.8%), maintenance (10.7%) and other expenditure (9.5) together make up almost a third of total opex. Professional services accounts for 5.7% of total opex over the regulatory period.

The remaining seven opex items account for about 15% of total opex, but are individually forecast to each represent less than 5% of total opex. Commentary on the reasonableness, in terms of industry norms, of this split of expenditure is beyond our engagement's scope.

P.5 Analysis of escalation rates – opex

P.5.1 Staffing costs

P.5.1.1 Approved escalation rate 2010-2015

During its 2010-15 investigation into GAWB's pricing practices; the QCA approved a staffing-cost escalation rate of 5%, consisting of 4% market movement (as advised by GAWB's consultant) and 1% performance-related movement.

P.5.1.2 Proposed escalation rate for 2016-2020

GAWB proposes to use the following escalation rates for staffing costs. These rates were based on those specifically forecast for GAWB by Mercer[38], using Mercer's industry experience, data on salaries held within their

[38] Mercer is a global consultant operating in the area of employee management and remuneration benchmarking.

remuneration database, and official economic indicators. Mercer considered the increasing cost of living, impact of the superannuation guarantee increases, increasing pressure on productivity levels, and penetration of short term incentives in developing the forecast.

Table P.3: Proposed escalation rates, 2016-2020

Year	2016	2017	2018	2019	2020
GAWB proposed escalation rates (%)	3.29	3.13	3.38	3.61	3.97

P.5.1.3 Analysis

As an individual item, staff or labour costs represent GAWB's largest opex component, accounting for 47% of total opex during 2016-2020.

P.5.1.4 Historic increases

Wage increases may be driven by a range of escalation rates and economic factors. These include settlements under enterprise bargaining agreements, the demand for, and supply of, workers, as well as general increases in prices. Such changes in the price of living are indicated by changes in the CPI. By comparison, the Wage Price Index (WPI) measures changes in the price of wages, which may be driven by changes in CPI or by underlying changes in the demand and supply within the labour market for particular worker groups.

Over the past five years (2010-14), the CPI has risen by 2.6% (nominal) per year on average in Australia. There is a specific CPI estimate for Brisbane (that is, 2.6% annual Brisbane CPI growth), which has not been included in the figure below.

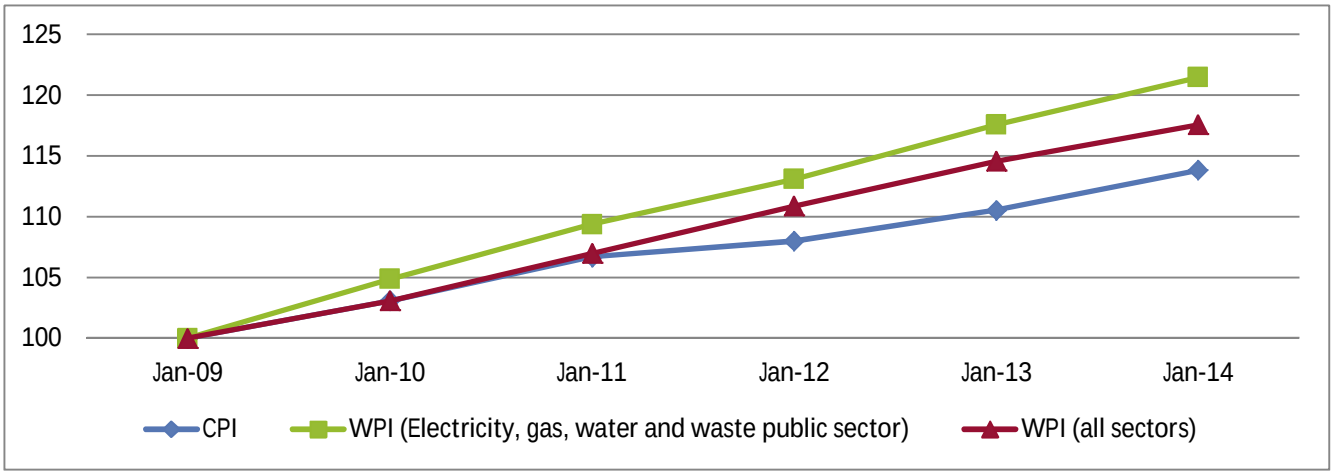
Figure P.2 demonstrates that the Australian WPI has grown at a faster rate, and averaged 3.3% (nominal) growth per year between 2010 and 2014. The 3.3% annual Queensland WPI growth has not been presented in Figure P.2 as it is extremely close to the Australian result shown below.

For the electricity, gas, water and waste sector, the Australian WPI has averaged 4.0% nominal growth per year.

Given that these WPIs are Australia-wide, it is possible that these results are dominated by capital city growth or other national factors and therefore may not fully reflect local factors affecting wages in GAWB's area of operation. As such, not all of these capital city or national factors would apply equally to GAWB, for which the labour market is predominantly in Gladstone (part of the Fitzroy region in Queensland) and to a much lesser extent in Brisbane[39]. However, we consider the Queensland and Australian WPIs to be useful guides for establishing a reasonable set of boundaries for a range of labour cost forecasts.

[39] GAWB's main corporate office is located in South Brisbane, which is in very close to the Brisbane Central Business District.

Figure P.2: Wage Price Index and Consumer Price Index, Australia, 2009 base year



(Source: ABS 2014a, ABS 2014b)

Over the 10-year period between 2004 and 2014, the Queensland WPI averaged 3.8% growth, whilst the CPI for Brisbane averaged 3.0% growth. Real WPI (estimated as percentage change in WPI less percentage change in CPI) averaged 0.8% growth over the period, and slightly higher growth of 1.1% in the five years to 2014. This is due to a decline in CPI over the more recent period which was not matched by a corresponding fall in wages growth (wages tend to respond more slowly to changed economic conditions than do prices, for example, due to the existence of wage agreements and the periodic review of contracts and salaries causing a lag).

P.5.1.5 Forecast increases

The Queensland Budget 2014 forecasts that the Queensland WPI will steadily increase over the period 2014 to 2017, then hold steady at 3.5% to 2018, as shown in Table P.4. No projections beyond 2018 were available.

Table P.4: WPI and inflation projections, Queensland

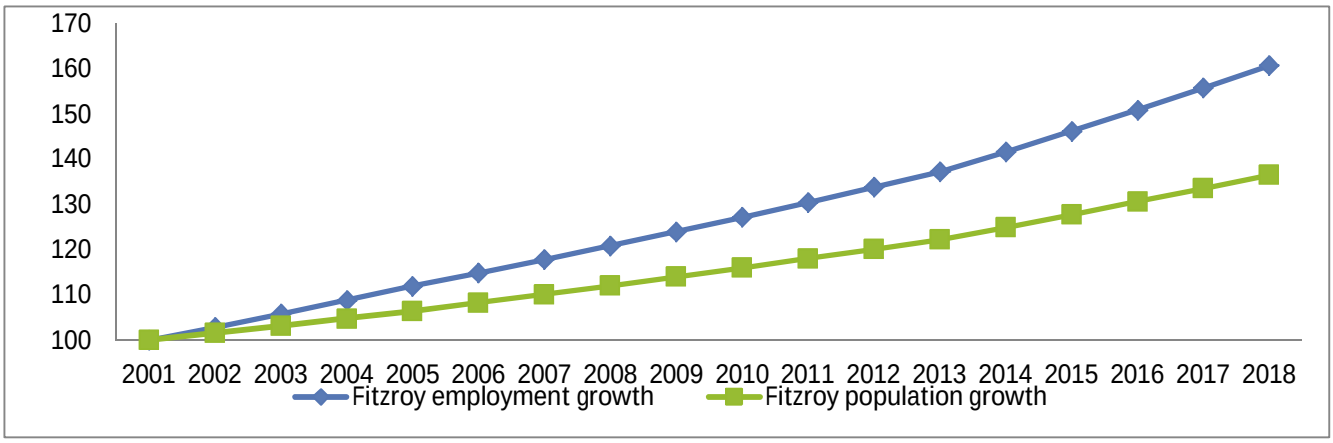
Year	2013-14	2014-15	2015-16	2016-17	2017-18
WPI (QLD)	2.75	3.0	3.25	3.5	3.5
Inflation	2.75	2.75	2.5	2.5	2.5

(Source: Queensland Government 2014)

Focussing on the region in which GAWB operates, there are additional factors which we consider will put upward pressure on wages. Over the ten years between 2002 and 2011, the Fitzroy region has experienced employment growth averaging 2.7% per year, significantly outweighing average population growth of 1.7% per year (see Figure P.3).

Looking forward from 2013 to 2018, the Australian Bureau of Statistics (ABS) projects population growth for the balance of Queensland (excluding Brisbane) to be 1.9% annually (ABS 2013), whilst employment growth for Fitzroy is projected to be 3.2% (Department of Employment 2013). This divergence is illustrated in Figure P.3.

Figure P.3: Population and employment index, Fitzroy, 2001 base year

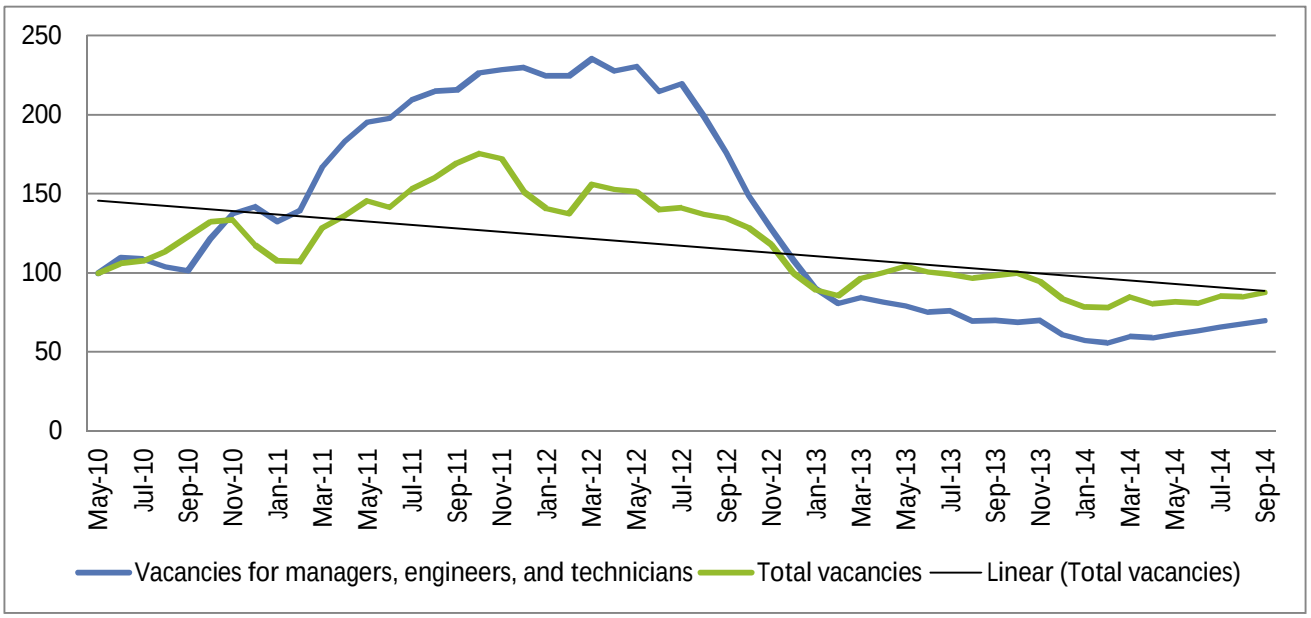


(Source: ABS 2012)

The combination of low unemployment rates (2.8% in 2011) and a participation rate of 63.4% (higher than the Queensland average), indicates that a growing demand for workers in the Fitzroy region is unlikely to be met simply by population growth, nor by drawing from those currently unemployed or out of the labour force and seeking work. This is likely to place increasing upward pressure on wages (all other factors being equal).

However, looking at advertised job vacancies in Central Queensland, we consider that some caution should be exercised in the choice of escalation rate. Job advertisements can be seen as a leading indicator of wage changes. Assuming a stable labour force, if job advertisements increase then wage rates will likely follow as employers compete to attract employees.

Figure P.4: Index of advertised vacancies in Central Queensland, May 2010 to September 2014, May 2010 base year



(Source: Department of Employment 2014)

As Figure P.4 demonstrates, the situation in Central Queensland is relatively volatile but a downward trend in job advertisements is evident over the past two years (2012-13 and 2013-14). This may be due to the closure of mines in the region, the postponement of mine development and/or the cessation of the intense liquefied natural gas (LNG) construction phase in Gladstone. The Queensland Treasury WPI escalation rate for 2013-14 of 2.75% reflects this recent downturn.

The regional job advertisement data also indicate the possibility of downward pressure on wages as jobseekers compete for an increasingly limited pool of jobs. Moreover, if the volatility in vacancy rates is driven by fluctuating employment in the mining sector within Central Queensland, the short-term result of this may be that GAWB can draw from a larger pool of potential employees to fill its employment requirements than has previously been the case.

Conversely, a change in wages may be minimal or not observed unless the downward trend in job advertisements continues for a longer period of time. There is no firm indication in the available data as to whether from 2014-15, vacancies will plateau or increase (refer May to September 2014 data in the above graph).

The historical trend for wage increases in Queensland, as measured by the WPI, has been 3.3% over the past five years and 3.8% over the past 10 years. The State Budget in 2014 forecasts a deviation - below this trend - between 2013 and 2016. However, Queensland Treasury forecast that the Queensland WPI will reach 3.5% in 2016-17.

One key question which we have tried to address is whether the Fitzroy region, in which GAWB predominantly operates (exempting its Brisbane office), is expected to experience wage increases that are different to the State's average.

Our review of employment and population projections indicate that wage increases may be higher in the Fitzroy region than the State's average, whilst actual recent vacancy data suggest that the reverse may be true. The Australian WPI for the electricity, gas, water and waste sector has grown faster than average WPI; however, this may be dominated by growth in salaries in capital cities.

P.5.1.6 Recommendation

Given this conflicting information, and the inherent uncertainty of the medium term, we recommend (refer Table P.5) that the escalation rate for GAWB's staff costs be forecast:

- To one decimal place only, reflecting the uncertainty of such forecasts
- Based on the available Queensland State Budget 2014 forecast increases for 2016 (3.25%), 2017 (3.5%), and 2018 (3.5%)
- Based on the 10-year average Queensland WPI of 3.8% for the remaining years 2019 and 2020.

Table P.5: Proposed staff cost escalation rates

Year	2016	2017	2018	2019	2020
GAWB escalation rate forecast (%)	3.29	3.13	3.38	3.61	3.97
Jacobs proposed rate forecast (%)	3.3	3.5	3.5	3.8	3.8

The uncertainty about future economic conditions, and in particular, labour rates in this region is high given the potentially reduced employment demand from mining and changing nature of LNG activity (as exports ramp up) in the medium term. Accordingly, we note that our recommendation, even to one decimal place, may ascribe a higher degree of certainty to our analysis than the subject matter admits.

Notwithstanding the above, we consider that GAWB's recommendations do not reflect an attempt to exercise monopoly power. On the contrary, GAWB's recommendations are reasonable. Accordingly, presented to one decimal place to reflect the maximum certainty that the subject matter admits, we could support GAWB's recommendations as follows. We also present our recommended escalation rates for comparative purposes.

Table P.6: Proposed staff cost escalation rates

Year	2016	2017	2018	2019	2020
GAWB escalation rate forecast (%) – to one decimal place	3.3	3.1	3.4	3.6	4.0

Year	2016	2017	2018	2019	2020
Jacobs proposed rate forecast (%)	3.3	3.5	3.5	3.8	3.8

Whilst we consider that the rates proposed by GAWB are reasonable, we consider that our recommendations are appropriate given the inherent uncertainties. We do not consider that the differences between these alternative views are material to GAWB's staffing costs.

P.5.2 Electricity

P.5.2.1 Approved escalation rate 2010-2015

For 2011-15, the QCA approved an escalation rate of 8% per annum for network costs. In addition, for contracted electricity, the QCA approved energy charges at contract value, and 8% per annum for non-contracted electricity.

P.5.2.2 Proposed escalation rate for 2016-2020

GAWB proposes to use escalation rates for electricity that vary annually, as per Table P.7. This is based on advice from Wedgewood White Ltd[40]. Wedgewood White broke GAWB's electricity costs into four cost components (retail, distribution, transmission and generation) and identified escalation rates for each component. They then produced a weighted average escalation rate per year, weighting each individual component's rate by the proportion of GAWB's electricity costs it represented.

Table P.7: GAWB proposed electricity escalation rates

Year	2016	2017	2018	2019	2020
Proposed escalation rate	9.83%	9.82%	9.60%	6.25%	6.25%

P.5.2.3 Analysis

As an individual item, electricity represents GAWB's second largest opex component, accounting for 10.8% of total opex during 2016-2020.

GAWB's operations are based in regional Queensland – with the network service provider (NSP) being Ergon Energy and the retailer being Ergon Energy Queensland (EEQ). GAWB has four large sites on contestable negotiated contracts (accounting for about 95% of its electricity costs) and a number of sites on standard retail contracts with regulated retail pricing (accounting for about 5% of electricity costs).

Contestable costs – market driven negotiated contracts

Contestable sites account for approximately 95% of GAWB's total operational electricity costs.

A number of retailers offer competitive large site contestable Electricity Sale Agreements (ESAs) in Queensland, with ERM currently in an agreement with GAWB expiring 31 December 2014. We have assumed a calendar year 2015 deal has either been done recently or is currently being negotiated, based on the information provided and or assessment.

GAWB adopts a standard forward approach to contracting large contestable sites, with wholesale forward electricity contracts driving a significant portion of their total retail electricity costs.

Other significant components include government environmental schemes – currently limited in Queensland to the Mandatory Renewable Energy Target (MRET) – which includes the cost of large generation certificates (LGCs) and small-scale technology certificates (STCs).

[40] Wedgewood White Ltd is a consultant operating in the energy sector.

In addition, GAWB pays network costs including transmission use of system (TUOS) and distribution use of system (DUOS). Other costs include Australian Energy Market Operator (AEMO) market, metering, retail and brokerage costs, which are applicable to GAWB given their approach to contracting.

GAWB acknowledge (at time of writing this report) that more up-to-date electricity market information has become available since their (above) escalation rates were proposed and, accordingly will accept variations in keeping with the changing market conditions. Refer further below.

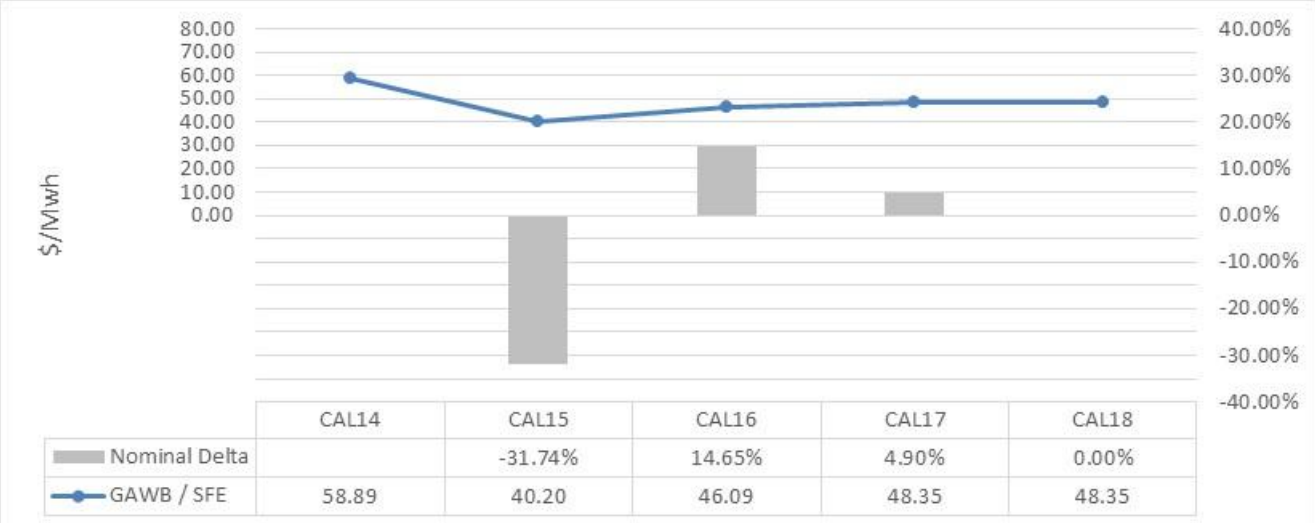
Wholesale black energy prices – electricity futures

GAWB's baseline wholesale price for calendar year 2014 was in line with market conditions at the time, taking into account the cost of carbon (under the Australian Government's Carbon Pricing Mechanism) at the time.

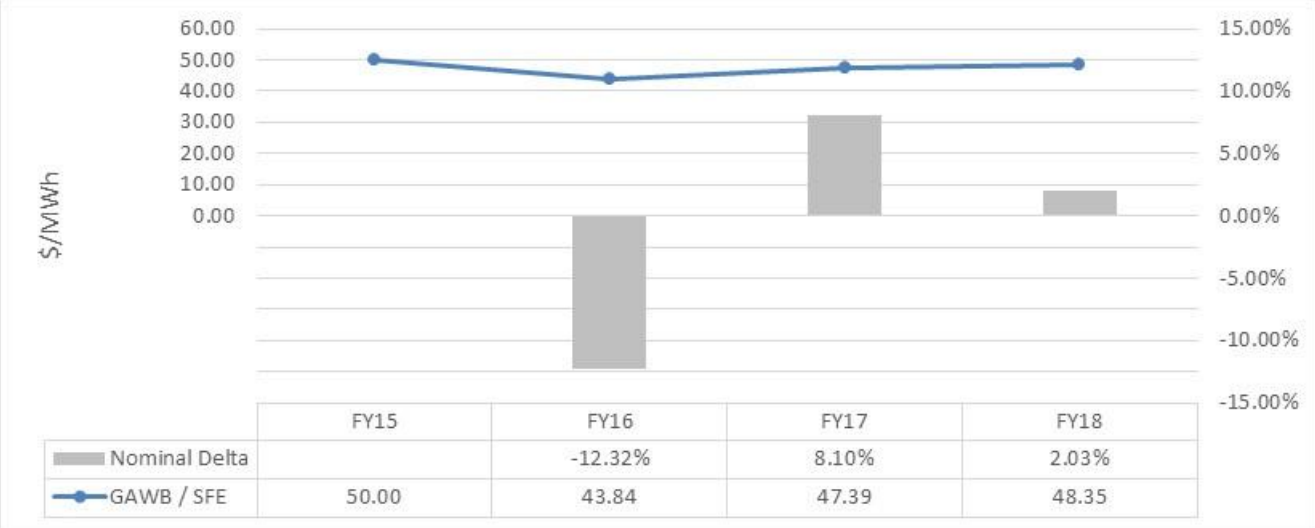
Assuming that contracting for 2015 onwards was conducted recently, or is yet to be carried out, a price of $40/MWh for 2015 (calendar year) should be assumed based on what is currently available in the market. This gives rise to our estimated baseline 2015 price of around $50/MWh.

The forward financial year contracts beyond GAWB's contracted period (2014) are currently trading as follows. Should GAWB elect to do so, savings available in 2015 also could be realised for 2016, 2017 and 2018 as shown in Figure P.5. We have assumed in the first part of the figure below that GAWB has not adopted this (our recommended) approach.

Figure P.5: GAWB and Forward Electricity Wholesale Black Energy Prices – Current Settle Pricing



	CAL14	CAL15	CAL16	CAL17	CAL18
Nominal Delta		-31.74%	14.65%	4.90%	0.00%
GAWB / SFE	58.89	40.20	46.09	48.35	48.35



Source: ASX Energy 2014

Should GAWB continue to maintain market exposure, historical forward price trends are not necessarily good indicators for future movement. Futures pricing is mostly driven by the underlying commodity (spot pricing) and forward fundamentals specific to the forward period.

Figure P.6 (below) shows spikes in escalation for calendar years 2008 (drought driven) and 2013 (carbon driven).

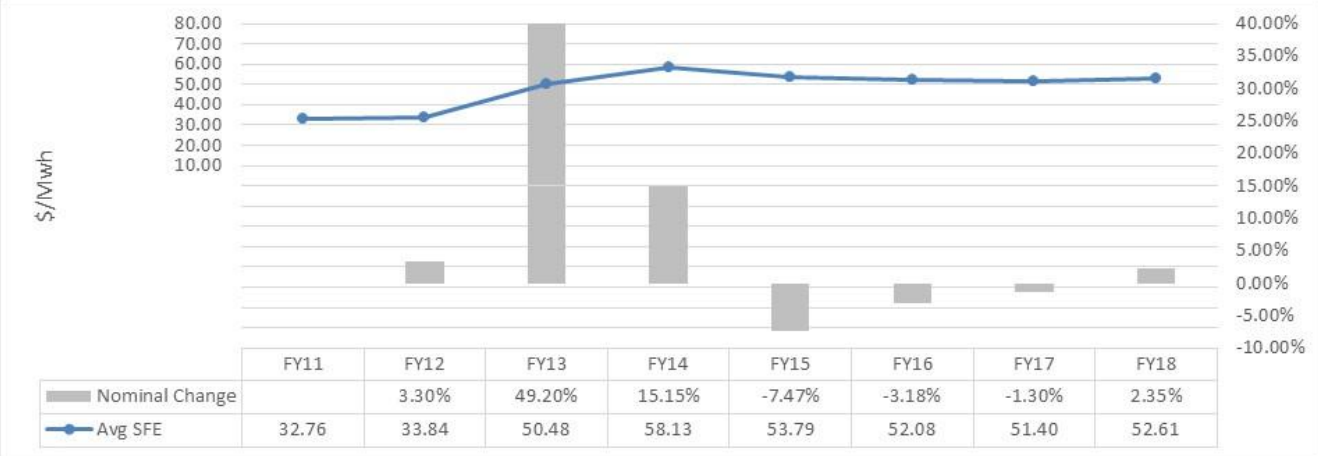
In calendar year 2014, the higher electricity demand expected from the LNG sector was priced into the curve. From that point, however, the curve starts to factor in real price reductions to 2018. This is particularly driven by lower than expected demand from the LNG developments. Spot pricing is also expected to remain contained (less price rises) due to significant solar PV take-up, which reduces demand for other sources of electricity.

For those forward periods that are experiencing liquid trading (i.e. high volumes of trading), we have applied an appropriate uncertainty contingency of 5-10% in the forecast forward contract rates, which increases the forecast wholesale market prices.

Should GAWB's contestable sites remain un-contracted for the calendar years beyond calendar year 2015, and hence remain exposed to wholesale electricity market movements, we consider that reasonable risk management measures could be implemented to limit adverse market movements to within 5% of nearer dated forward contract periods and within 10% of latter dated forward contract periods (within the GAWB assessment period). These risk limits have been adopted to set forward wholesale market rates that drive GAWB contestable retail costs.

For years beyond 2018, we have adopted an average historical financial year escalator.

Figure P.6: SFE Forward Electricity Wholesale Black Energy Prices – Average Settle Pricing



	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18
Nominal Change		3.30%	49.20%	15.15%	-7.47%	-3.18%	-1.30%	2.35%
Avg SFE	32.76	33.84	50.48	58.13	53.79	52.08	51.40	52.61

Source: ASX Energy 2014

Wholesale environmental costs – LGCs and STCs

The state based Queensland Gas Scheme closed on 31 December 2013 and the federal Clean Energy Act (Carbon) scheme ceased from 1 July 2014, following the start of the Clean Energy Legislation (Carbon Tax Repeal) Act 2014. With the Australian Government, in particular, being vocal about legislating for decreasing energy costs, we assume that neither a state nor federal based scheme will return in during the 2016-20 forecast period.

MRET remains under review with the Australian Government seeking bipartisan support for a 20% target. This should see LGC pricing contained at or below current levels in the medium term. STC pricing has been elevated near the ceiling price of $40 for some time as the regulator used higher percentage liability values to reduce surplus supply. We see no reason for the regulator to change this approach; however, given the current supply-demand dynamic and market pricing, we expect both the LGC and STC liability percentages to remain around 10% for the relevant forecast period.

Market pricing indicates that forward environmental certificates typically trade at a cost of carry of between 3.5-4.5%. A mid-point of this range has been adopted for periods that are not otherwise clearly trading in the market. A 5% contingency has been used for periods that are currently experience liquid trading.

GAWB baseline certificate rates for calendar year 2014 were $37.07/LGC and $39.00/STC. Calendar year 2015 should be contracted marginally under these levels, resulting in baseline 2015 rates of around $36.50/LGC and $38.00/STC.

Distribution use of system (DUOS) costs – Ergon Energy

Ergon Energy has released its Regulatory Proposal for 2015-2020. Ergon has indicated a commitment to reducing what they charge for the use of the network, and “keeping increases overall in network charges under inflation for the five years”. However, we cannot see DUOS remaining at or below inflation during the latter period of 2015-2020.

We note that in the AER’s draft determinations for NSW and ACT electricity distributors and transmission utilities, the AER has abandoned its previous acceptance of the use of cost escalators based on a weighted basket of constituent cost indices (steel, copper, aluminium, labour etc.) in favour of adopting CPI targets / forecasts for utility cost escalations. We are aware, that it recognition of this, Ergon has proposed CPI escalation of its costs over the next regulatory period in its submission to the AER. We have therefore assumed a 2.5% annual increase in DUOS charges.

Transmission use of system (TUOS) costs – Powerlink

Powerlink's current regulatory period runs to the end of 2017. We support GAWB's estimates of 4.7% growth in TUOS until the end of 2017. Beyond this, and again with consideration to resurgence in large industrial projects, we have forecast TUOS costs to increasingly exceed CPI over the period. We note that Transgrid has recently submitted a Revenue Proposal in NSW that has their TUOS costs be capped at CPI + 3% (i.e. approximately 5.5% nominal per annum) for the period 2015 to 2019. However, we consider that, in line with its other draft determinations, the AER will propose a CPI based escalation on TUOS costs.

Market costs - AEMO

AEMO market costs are relatively insignificant and are as per AEMO's forecast published in May 2014 to 2019. Beyond that we have adopted CPI.

Retailer and brokerage costs

GAWB's calendar year 2014 ESA indicates a retail margin of around 3-5.5% of energy costs, or $2.16-3.46/MWh. Brokerage was fixed at 1.5% of energy costs, or $1.03/MWh. These figures suggest retail margin is on the high side; however, it is relatively insignificant. We recommend that both components be indexed by CPI.

Regulated retail costs – standard contracts

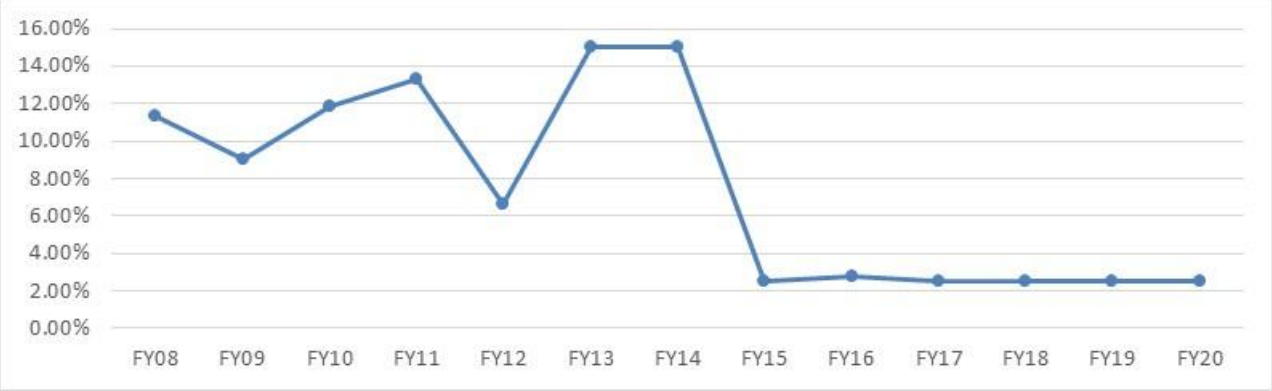
As noted above, GAWB's operations are based in regional Queensland so the NSP is Ergon and its retailer is EEQ, with any regulated retail pricing set annually by the QCA.

These costs account for approximately 5% of GAWB's total operational electricity costs, with limited information provided by GAWB on sites and the specific tariffs. We consider this to be acceptable as in this section we are analysing potentially immaterial changes (if any) in up to 5% of a 10.8% cost item. That is, as a result of our recommendations, regulated electricity costs may change (if at all) by an amount less than 0.5% of GAWB's total opex during 2016-20).

The QCA's regulated pricing increases have been historically linked closely to expected increases in both wholesale market prices and network costs. Network investment and carbon have typically driven higher year on year increases, as indicated in Figure P.6.

The assumption that regional Queensland regulated retail pricing will follow CPI essentially also makes the assumption that both wholesale market prices and network costs will also follow CPI. We do not share this sentiment. We've elected to model regulated retail costs based on expectations in the wholesale market and network costs. Figure P.7 refers.

Figure P.7: QCA Regulated Pricing Increases to 2015, GAWB Forecast 2016 to 2020



(Source: QCA Determinations 2014. 2013-2015 estimated rounded tariff specific increases documented and GAWB tariffs unknown)

P.5.2.4 Recommendation

We recommend that the escalation rate for GAWB's electricity costs be forecast:

- To one decimal place only, reflecting the uncertainty of such forecasts
- As per the figures shown in Table P.8 and Table P.9
- Based on the source data summarised in Table P.9

Table P.8: Jacobs' derived electricity escalation rates – by component

Recommendation						
Component	% of GAWB Total Costs	2016	2017	2018	2019	2020
Regulated EEQ retail pricing	5.0%	4.7%	8.4%	5.0%	5.0%	5.0%
Wholesale black energy rates	27.2%	5.7%	13.1%	7.6%	7.6%	7.6%
Wholesale Environmental - LGC rates	3.9%	2.5%	4.0%	3.9%	4.6%	4.0%
Wholesale Environmental - STC rates	5.9%	-1.0%	4.0%	4.0%	4.0%	4.0%
Network Charges - TUOS	11.2%	4.7%	4.7%	2.5%	2.5%	2.5%
Network Charges - DUOS	44.4%	2.5%	2.5%	2.5%	2.5%	2.5%
AEMO Market charges	0.6%	5.1%	2.5%	4.9%	2.3%	2.5%
Metering charges	0.3%	2.8%	2.5%	2.5%	2.5%	2.5%
Retail charges	1.0%	2.8%	2.5%	2.5%	2.5%	2.5%
Brokerage/consultant charges	0.4%	2.8%	2.5%	2.5%	2.5%	2.5%
Total (Nominal)	**100%**	3.5%	6.1%	4.2%	4.2%	4.2%

Table P.9 compares GAWB's proposed and our draft recommended electricity escalation rates for GAWB during 2016-20.

Table P.9: Proposed electricity escalation rates - summary

Year	% of GAWB Total Costs	2016	2017	2018	2019	2020
GAWB proposed escalation rate (Nominal)	100%	9.83%	9.82%	9.60%	6.25%	6.25%
Jacobs proposed escalation rate (Nominal)	100%	3.5%	6.1%	4.2%	4.2%	4.2%

The summary of key sources for our findings are summarised below in Table P.10.

Table P.10: Jacobs' summary of key sources for electricity escalation rates

Component	Source
% of GAWB Total Costs	Regulated EEQ retail pricing percentage provided by GAWB. Other figures derived from GAWB historical energy costs – less carbon cost impact
Regulated EEQ retail pricing	QCA, Ergon, Powerlink, SFE – combination of expected movement in wholesale pricing and network costs (as these are historically the main contributors to the movement in this pricing component)
Wholesale black energy rates	GAWB, SFE, GFI Brokers, NEO Mobile – combination of expected movement from GAWB contracted rates to projected market rates, with consideration to historical and forward derivative pricing, spot pricing, and key forward fundamentals

Component	Source
Wholesale Environmental - LGC rates	GAWB, GFI Brokers - combination of expected movement from GAWB contracted rates to projected market rates, with consideration to historical, spot and forward pricing, and key forward fundamentals
Wholesale Environmental - STC rates	GAWB, GFI Brokers - combination of expected movement from GAWB contracted rates to projected market rates, with consideration to historical, spot and forward pricing, and key forward fundamentals
Network Charges - TUOS	Powerlink/AER – with consideration to recent Transgrid proposal and AER draft determinations 4.7% for initial years, CPI (2.5%) in the latter years
Network Charges - DUOS	Ergon/AER CPI (2.5%) during this regulatory period 2016-2020
AEMO Market charges	AEMO/CPI
Metering charges	CPI
Retail charges	CPI
Brokerage/consultant charges	CPI

P.5.3 Operations, maintenance, chemicals and all other expenditure

This section covers cost escalation for the following cost categories:

- Operations and maintenance (10.7%)
- Other expenditure (9.5%)
- Chemicals (3.7%)
- Other items such as motor vehicles (3.4%), water quality monitoring (1.5%) and information technology (0.6%)

The escalation rates determined in this section, therefore, will impact 29.4% of total opex during 2016-20. Excluding chemicals, a rate for other costs will impact 25.7% of total opex over the five-year regulatory period.

P.5.3.1 Approved escalation rate 2010-2015

For 2010-15, the QCA approved an escalation rate of 2.43% for operations, maintenance, chemicals and other costs, being the CPI forecast provided by the QCA's consultant. The QCA did not approve a separate escalation rate of 4.84% (suggested by GAWB) for chemicals, as this was based on a three-year average during a peak price period. The QCA did not approve a separate escalation rate (also submitted by GAWB) of 6.3% for maintenance costs, for the same reason.

P.5.3.2 Proposed escalation rate for 2016-2020

For 2016-20, GAWB proposes to use an escalation rate of 2.5% for operations, maintenance, chemicals and all other expenditure. This is the midpoint of the RBA's target inflation band. The use of the inflation rate as an escalator for operations, maintenance, chemicals and other costs is supported by regulatory precedent, having been approved by the QCA for GAWB's 2010-15 regulatory period.

P.5.3.3 Analysis

As noted above, this section covers up to 30% of GAWB's total proposed opex during 2016-20. As an individual item, maintenance represents the third largest opex component (10.7%) for GAWB during 2016-2020. In addition, chemicals expenditure (3.7%) is greater than expenditure on insurance (3.6%), regulatory fees (2.4%) and local government rates (1%). GAWB has presented an escalation rate specific to all three of the latter cost categories.

Following analysis of the data, we consider that the two cost categories of maintenance and chemicals warrant individual consideration for specific escalation rates rather than (necessarily) aggregating them with 'other expenses'. This section sets out what we consider should be the three appropriate escalation rates for maintenance, chemicals and then 'other expenditure' items.

Maintenance

The ABS produces a Producer Price Index (PPI) for Output of the Construction Industries (Non-Residential Construction, Queensland) (ABS 2014c). This index records changes in the prices received by producers within that industry. We consider this to be suitable, given available alternatives, for use as an escalation rate for GAWB maintenance.

As depicted in Figure P.8 (below), three distinct periods of price change are evident: (i) rapid growth in the period to 2008; (ii) a sharp decline; and (iii) a second period of slower growth from 2009 to 2014. The five-year average annual increase in prices was 1.0% (CPI 2.5%), and the 10-year average was 2.6% (CPI 3.0%) during this period.

Chemicals

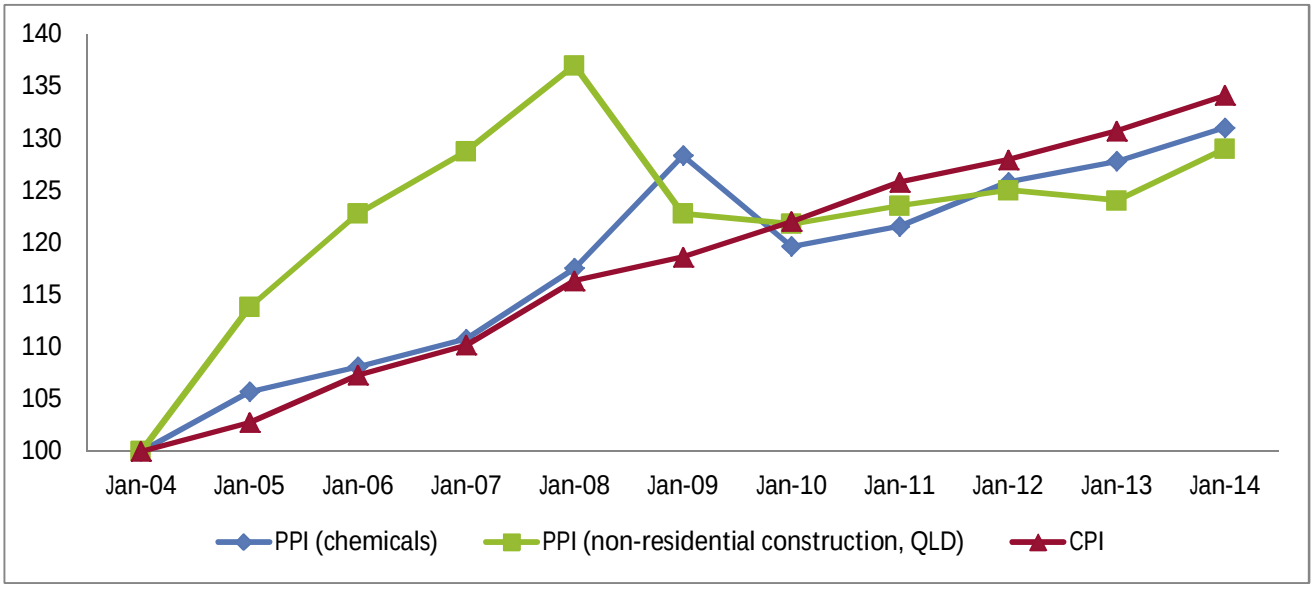
Similarly to the maintenance category, the ABS produces a PPI for Outputs of the Manufacturing Industries (Basic Chemicals) which records changes in the prices that the chemical producer receives for its output. As depicted in Figure P.8PI.8, with the exception of the period between 2008 and 2010, there has been a steady increase in chemical prices. The average annual increase was: 0.4% over five years; and 2.7% over 10 years.

Other expenditure

For the remaining expenditure within this category, that is 'other expenditure', we consider the most appropriate cost escalation rate to be CPI. From our review of potentially suitable indices, we have not identified more suitable cost-specific indices (e.g. PPIs).

Over the past 10 years to 2014, the CPI has risen at an average rate of 3.0% annually in Brisbane (3.5% between 2004 and 2009, followed by 2.5% between 2009 and 2014). The Queensland Government Budget predicts inflation of 2.5% between 2015-16 and 2016-17. This is consistent with the midpoint of the RBA's target inflation band.

Figure P.8: PPI Non-Residential Construction, PPI Basic Chemicals and CPI for 2004-2014 (2004 base year)



We consider that the PPIs for maintenance and chemicals, respectively, are more closely linked to these cost categories (for GAWB) than CPI. The reason is that CPI is a basket of *household* consumer goods, dominated by capital city price movements in those goods. The basket does not contain construction maintenance costs or industrial chemical use.

Our preferred PPIs fluctuate (at times considerably) around CPI. However, calculating the PPI averages over a longer time period (such as 10 years) gives a more stable PPI relationship to long-term CPI. That is, CPI is currently 2.5% (2.43% for 2010-15) and the 10-year annual average for the maintenance PPI is 2.6% and chemicals PPI is 2.7%.

P.5.3.4 Recommendation

We recommend applying a cost escalation rate for chemicals of 2.7%, which is based on the average change in PPI for Outputs of the Manufacturing Industries (Basic Chemicals) over the recent 10-year period.

We recommend applying a cost escalation rate of 2.6% for maintenance, based on the average change in PPI for Output of the Construction Industries (Non-Residential Construction, Queensland) over a 10-year period. We consider percentage changes in this index an appropriate proxy for escalating GAWB's maintenance costs.

Finally, we recommend a cost escalation rate of 2.5% for all 'other expenditure', which is the midpoint of the RBA's target inflation band.

Regardless of the outcome of the QCA's Price Monitoring of GAWB for 2016-20, we recommend that the escalation applied is reviewed again as part of any subsequent regulatory review.

As previously mentioned, we do not consider that our recommendations will have a material impact on GAWB's operating expenses, and they are not dissimilar to GAWB's original proposal.

P.5.4 Professional engineering services

P.5.4.1 Approved escalation rate 2010-2015

For 2010-15, GAWB proposed to use an escalation rate of 4.63%, being the three-year average (2007-2009) of the Property and Business Services WPI. This escalation rate was approved by the QCA.

P.5.4.2 Proposed escalation rate for 2016-2020

For 2016-20, GAWB proposes to use a rate of 3.4% annually, the three-year historical average of professional, scientific and technical services [WPI] (All Sectors) (September 2013), to escalate professional engineering services costs. Although not stated by GAWB, we understand that the source of this rate is the ABS' WPI.

We understand that, where the term 'professional services' is used throughout the GAWB submission, this is equivalent to 'professional engineering services' referenced in Table 15 of the GAWB submission.

P.5.4.3 Analysis

As an individual item, professional services represent 5.7% of total opex for GAWB during 2016-2020.

We consider that using the WPI would be appropriate if GAWB was directly paying the wages of those people providing professional services. However, GAWB, as with all organisations who engage contractors to provide services, actually pays a fee determined by the contractor (or consultant). This fee reflects not only the contractor's costs in providing the services, but also current market conditions.

Given that professional services firms rely on skilled personnel to provide services, it is preferable and faster for the firm to reduce fees (and therefore profits) in a weak market, than to reduce the wages of its staff. Our analysis of the consulting market in Queensland, and indeed throughout Australia, reveals that almost all

professional consulting firms have reduced hourly rates charged for staff, in nominal terms, over the last two to three years.

We consider, therefore, that the most relevant measure of the prices paid by GAWB for professional engineering services is the PPI rather than a WPI. A PPI tracks the actual prices received by producers for their output. For GAWB, we consider the applicable PPI to be Engineering Design and Engineering Consulting services (ABS 2014c). This PPI has increased by 1.8%, on average, over the five years to June 2014.

By contrast, between 2004 and 2009 the PPI increased by 8.3% annually on average, reflecting the strong growth in the mining and energy sectors during that period.

P.5.4.4 Recommendation

We recommend an annual escalation rate for professional engineering services of 1.8% between 2016 and 2020, based on the five-yearly averages for the Engineering Design and Engineering Consulting services PPI. The recent five years is selected, rather than 10 years, on the basis that the sector is undergoing structural change with a number of recent company consolidations and acquisitions. The early years of the 10-year period is also considered to incorporate an operating environment that will not apply going forward (i.e. prior to the downturn in the mining and energy sectors).

Our recommendation rests on our view, following analysis, that the PPI is more closely related to the prices likely to be paid by GAWB than the WPI upon which GAWB's 3.4% proposed annual increase was based. Given that professional services represents 5.7% of GAWB's total opex over the regulatory period, and that the change proposed by us represents a difference of 1.6% from GAWB's proposed escalation rate, we do not consider that selection of our escalation rate over GAWB's will have a material impact on total opex (or prices).

P.5.5 Insurance

P.5.5.1 Approved escalation rate 2010-2015

For 2010-15, the QCA approved an escalation rate for insurance of 5% for the first three years and CPI thereafter. This was based on advice from its consultant.

P.5.5.2 Proposed escalation rate for 2016-2020

GAWB proposes to use an escalation rate of 5% per year for insurance costs, based on a letter outlining a (commercial) forward estimate provided by GAWB's insurance broker (Marsh). Marsh based this estimate on their knowledge of the insurance market and GAWB's particular situation.

P.5.5.3 Analysis

As an individual item, insurance represents 3.6% of total opex for GAWB during 2016-2020.

The broker

As noted by Marsh, there are a number of factors affecting the cost of insurance. These include the state of the insurance market, reinsurance costs, natural disaster costs (both local and worldwide), interest rates, GAWB's claim history and the value of GAWB's assets. To the costs arising from this list, CGU Insurance (2011) adds the cost of administering insurance policies, government taxes and commissions paid to insurance intermediaries.

Our experience of other, comparable, water businesses is that there have been recent increases in insurance costs from CPI (2.5%) to successive years where cost escalation has exceeded 50% per annum. Such decisions relate to entity-specific events, the management and provision of insurance-related and event information, relationships with brokers and other commercial factors.

As GAWB's broker, therefore, Marsh is considered by us to be in a strong position to advance a generally credible forecast for 2016-20.

Insurance sector data

A very limited amount of information is available on changes in insurance costs. Between 2010 and 2014, the cost of household insurance in Brisbane rose by an average of 5.9% annually (ABS 2014a). This is less relevant to GAWB, for whom the two most significant components of insurance costs are Industrial Special Risk (ISR) insurance ($418,000 of premiums paid by GAWB in 2014) and Combined Liability ($255,000 of premiums paid by GAWB in 2014). Other insurances have been excluded from consideration as they are immaterial.

The main differences in cost for household insurance compared to business insurance relates to the different respective risk profiles, the value of the asset insured, the sophistication of the buyer, and the cost of administering the policy. Some major risk factors, such as natural disasters, affect both businesses and households. Likewise, factors affecting administration costs, such as insurance firm or broker staff salaries, are likely to be experienced by household and business insurers.

Economies of scale are likely to be present for larger business policies. However, this is factored into the total premium paid and not the rate of change of that premium over time. In simplistic terms, insurance premiums can be estimated using the following formula:

Insurance premium = Insured asset value X insurance cost per $ of insured asset value

Where the insurance cost per dollar of asset value takes into account the other factors mentioned previously, such as reinsurance costs, administration and natural disaster costs. When separated in this way, it is simple to ascertain whether changes in insurance premiums are driven by the amount of insurance coverage required (a decision made by GAWB) or a change in the cost of insurance provision (largely outside GAWB's control).

GAWB's insurance data

The largest component of GAWB's insurance portfolio is ISR insurance. GAWB has provided historical data on the value of the asset insured and the premium paid each year since 2011. Table P.11 refers.

Table P.11: GAWB historical insurance data - ISR

ISR	2011	2012	2013	2014	2015	Average
Asset value ($'000s)	485,966	629,547	711,976	777,052	804,481	
% change in asset value		29.5%	13.1%	9.1%	3.5%	13.4%
Premiums paid ($'000s)	273	362	418	456	450	
% change in premium		32.5%	15.7%	9.1%	-1.5%	13.3%
Premium per $ asset value	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%

As can be seen in Table P.11, the value of the asset insured has varied widely over the past five years. It is more likely that this is due to changes in GAWB's physical assets insured, rather than market-driven fluctuations in the value of a constant physical asset base over time. Whilst the value of the asset insured over this time has risen by 13.4% annually (on average), the insurance premium per $ of insured asset value has remained stable, suggesting a linear relationship between asset values and premiums. That is, the insurance premium has been 0.06% of insured asset value for the past five years. However, it is noteworthy that for ISR, from 2014 to 2015, the asset value increased 3.5% but the premium paid reduced by 1.5%. This indicates that, in addition to the value of assets insured, other factors (e.g. market conditions) do have a bearing on premiums paid by GAWB.

For Combined Liability insurance, the limit of liability covered has remained constant over the past five years, and the insurance cost per $ of liability covered has also remained stable at 0.1%. Table P.12 identifies the

asset value, limits of liability and premiums paid by GAWB over the past five years for Combined Liability insurance.

Table P.12: GAWB historical insurance data – Combined Liability

Combined Liability	2011	2012	2013	2014	2015	Average
Limit of liability ($'000s)	200,000	200,000	200,000	200,000	200,000	
Premiums paid ($'000s)	268	272	255	260	254	
% change in premium		1.5%	-6.4%	2.0%	-2.5%	-1.4%
Premium per $ of liability covered	0.13%	0.14%	0.13%	0.13%	0.13%	0.13%

We note that, on average, combined liability premiums have fallen by 1.4% annually between 2011 and 2015.

A summary view of GAWB's insurance costs is presented in Table P.13, which identifies total insured value and changes in that value, and total premiums and changes therein, paid by GAWB over the past five years.

Table P.13: GAWB historical insurance data – total insurance (ISR and Combined Liability)

Total Insurance	2011	2012	2013	2014	2015	Average
Total insured value ($'000)	685,966	829,547	911,976	977,052	1,004,481	
% change in insured value		20.9%	9.9%	7.1%	2.8%	10.2%
Total premiums paid ($'000)	541	634	673	717	703	
% change in premium		17.14%	6.19%	6.40%	-1.9%	7.0%

Table P.13 shows that the average increase in premiums paid by GAWB for the past five years is 7% annually. This increase is primarily driven by underlying changes in the value of assets covered by ISR insurance (asset value increasing by 13.4% annually on average). However, for the last two years, there was an average increase in premiums of 2.3% per annum, whilst, over the same period, the asset value increased on average by 6.3% per annum. We note a decrease in premiums of 1.9% in the final year.

Changes in the value of assets covered may occur due to either deliberate changes in GAWB's strategy (e.g. which assets to insure), or market-driven changes in the value of the asset. If the changes are a result of changes to GAWB's insurance strategy, the escalation rate should be tied to changes in premiums per unit of insurance coverage, rather than the total premium paid. If market-driven, an escalation rate may be able to be established depending on the specific asset insured.

For most assets insured, their nominal insured value is likely to escalate in accordance with CPI, and this could be used as a basis – at least in part - for escalating insurance premiums, given that premiums per dollar of insured value have historically been relatively constant. However, information on the real value of assets insured over the 2016-20 regulatory period is not currently available, and given its immateriality, may not justify further investigation. Moreover, other than value of assets insured, we and Marsh consider that other factors (including market conditions) will impact the rate of cost escalation.

P.5.5.4 Recommendation

On balance, and in large part, we accept GAWB's proposed 5% escalation rate for insurance, on the basis of average past increases in the order of 7% per annum and given the uncertainty going forward for 2016-20. However, we note recent actual data from GAWB showing a 1.9% decline in premiums in the past year and an average increase in the past two years of only 2.3% (less than CPI of 2.5%). We cannot ignore this recent actual data in forming our recommendation – noting it may impact early years of the regulatory period.

The data indicates the uncertainty of future insurance costs, but that under current market conditions early movements in premiums for GAWB should be on the downside rather than the upside of 5%. Based specifically on the recent two years of data provided by GAWB, we consider an approach akin to that taken by the QCA in

its 2010-15 pricing practices investigations constitutes a suitable model (i.e. 5% for three years and 2.5% for two years).

We recommend applying CPI of 2.5% for 2016, and a 5% per annum increase for 2017 to 2020 (the subsequent four years). This recommendation is based on the recent low increases in asset values and premiums (including the 1.9% overall decrease to 2015 and the average increase of 2.3% in total premiums over the past two years). We consider CPI will be closer to the price increases likely to be faced at the start of the regulatory period, based recent data. However, we note that increases in the order of 5% per annum may occur later, based on Marsh's view. We therefore accept Marsh's recommendation for larger increases for the later years in the regulatory period of 2017-2020 to accommodate the greater uncertainty of those outlying years.

Finally, we understand, from our review that the escalation rate is predominantly driven by the value of the insurance held by GAWB, and that this could be reviewed (separately) in relation to the prudency of the value of the assets insured by GAWB over the regulatory period. If the value of the assets insured does not change, the escalation rate could be lower than 5% in the out years, given that this is predicated on rising asset values based on past actuals, and other factors.

From our analysis, there is no material impact on GAWB's opex as a result of the QCA accepting our recommendation, given that insurance represents 3.6% of total opex over the regulatory period. We note that our recommendation accords with GAWB's submission in all but 2016 and accordingly – give the uncertainty – consider that GAWB's estimate was provided in good faith and could be considered to be reasonable.

P.5.6 Regulatory fee

P.5.6.1 Approved escalation rate 2010-2015

For 2010-15, the QCA approved an escalation rate of 2.43% per year, being the CPI forecast provided by QCA's consultant.

P.5.6.2 Proposed escalation rate for 2016-2020

For 2016-2020, GAWB proposes to escalate regulatory fees at 5.8% per year. We understand this is based on past actuals estimated by GAWB on advice received from the QCA.

P.5.6.3 Analysis

As an individual item, regulatory fees represent 2.4% of total opex for GAWB during 2016-2020. We understand that the purpose of the regulatory fees is to recover from GAWB the regulatory costs, incurred predominantly by the QCA during the 2014-15 price monitoring review, but annualised over the five-year regulatory period 2016-20.

GAWB's annual cost estimates for regulatory fees during 2016-20, therefore, are more akin to an annuity than cost escalation. For this purpose, we consider as reasonable and hence appropriate any approach that recovers the efficient regulatory costs, in real terms, over the regulatory period. That is, a cost escalation rate of 2.5% per annum – with a higher starting cost – could be equivalent to a 5% escalation rate over the same period – but with a lower starting cost.

If the approach is an annuity, then a range of annual cost increases between (and including) CPI and GAWB's current approach are among the viable options. The test is for GAWB's payments to equate to the real cost levied by the QCA.

The QCA has advised that it is reviewing its approach to regulatory fees, and that this will be available in between the QCA's draft and final reports. In the meantime, GAWB's approach seems reasonable as it is based on past QCA practices.

P.5.6.4 Recommendation

We accept GAWB's approach for escalating regulatory fees, and recommend that any revised escalation rates would be provided by the QCA.

P.5.7 Local government rates

P.5.7.1 Approved escalation rate 2010-2015

The QCA approved an escalation rate of 5.3% per year for local government rates (council costs) paid by GAWB for 2010-2015. This was based on the February 2009 Council Cost Index (CCI) produced by the Local Government Association of Queensland (LGAQ).

P.5.7.2 Proposed escalation rate for 2016-2020

For 2016-20, GAWB proposes to use the March 2014 version of the CCI to escalate council costs. The proposed rate is 2.6% annually. Use of the CCI to escalate council costs is consistent with QCA regulatory precedent, having been approved for use in the 2010-15 regulatory period.

P.5.7.3 Analysis

As an individual item, local government rates represent 1% of total opex for GAWB during 2016-2020.

The CCI is a weighted index of the WPI (50%), road and bridge construction index (30%), and CPI for Brisbane (20%). These components represent drivers of changes in council costs. In March 2014, the LGAQ advised that a 2.6% increase in rates per capita would be required to maintain the current level of council service provision in 2014-15 (LGAQ 2014).

Applying this rate to GAWB's council costs is problematic for several reasons. Firstly, the 2.6% is estimated on a per capita basis, and it is unclear to us how this applies to a business entity. Secondly, it assumes that Gladstone Regional Council (GRC) aims only to maintain, rather than improve, services. Whereas the GRC's Long Term Financial Plan proposes one third of its projected capex over the next 10 years is for new projects, with the remainder being spent on replacing existing assets. This suggests that per-capita council costs are likely to increase by more than 2.6% per year.

The Long Term Financial Plan also contains assumptions that are relevant to this analysis. Specifically, in developing the plan, the GRC assumed that industrial rates would rise by 10% per year to 2018, and 5% per year from 2019 onwards, and that residential rates would rise by 5% per year over the same period (GRC 2014).

GAWB advised us that it is not considered to be an industrial customer of GRC for the purpose of rates, so the 10% annual cost increase is thought unlikely to apply to GAWB. Accordingly, any forecast residential rate rises may be a proxy for the council cost increases that would likely be faced by GAWB.

P.5.7.4 Recommendation

Taking the above into account, we recommend that an escalation rate of 5% per year is used to escalate GAWB's council costs. This is considered by us to be more reflective of the future rates collected by GRC, when compared with the CCI. Whilst this recommendation is a significant change to GAWB's proposed rate, the impact is likely to be immaterial given that council costs represent 1.0% of GAWB's total opex over the regulatory period.

P.5.8 Escalation rates post 2020

P.5.8.1 Approved escalation rate 2010-2015

As part of the previous investigation, we understand that the QCA approved an escalation rate of 2.5% per year for all opex in the period 2021 to 2035.

P.5.8.2 Proposed escalation rate for 2016-2020

For all opex in the period 2021 to 2035, GAWB proposes to escalate costs at CPI of 2.5% per year. This is consistent with regulatory precedent.

P.5.8.3 Analysis

Given that staffing costs represent 47% of total opex over 2016-2020, we recommend a weighted average of the state WPI for labour and CPI for other costs (i.e. 53%). Adopting this recommendation will result in a long-term weighted cost escalation rate from 2021 to 2035 of 2.9% per annum (rather than CPI). Table P.14 refers.

Table P.14: GAWB historical insurance data – total insurance

Rate	Weighting	Long Term Rate (%)	Weighted Input (%)
Labour WPI	47%	3.3	1.6
Other CPI	53%	2.5	1.3
Weighted Average			2.9

Such an approach will more accurately reflect than CPI, GAWB's future cost increases. However, given the nature of the applicable economic regulatory framework (i.e. price reviews on a five yearly basis) we accept GAWB's proposed use of CPI from 2021 and note that it is reasonable, based on regulatory precedent (including those established by the QCA).

P.5.8.4 Recommendation

We accept GAWB's proposition that a rate of 2.5% per year should be used to escalate its opex from 2021, but would alternatively recommend 2.9% per annum if the regulatory framework did not allow five-yearly reviews.

P.6 Analysis of escalation rates – capital expenditure

P.6.1 All capital expenditure

P.6.1.1 Approved escalation rate 2010-2015

For 2010-15, GAWB proposed to use multiple escalation rates as follows:

- Three-year average of the property and services wage price index for contingent supply expenditure where consulting engineering costs dominate expenditure
- Three-year average of the general Queensland construction index for capital expenditure dominated by construction costs
- CPI for all other expenditure

We understand that, in its 2010-2015 price review for GAWB, the QCA considered a three-year average was unable to provide a reliable cost escalation over the planning period, and a more forward-looking approach was required. In the interim, the QCA approved CPI as the escalation rate for all capital expenditure over the period.

P.6.1.2 Proposed escalation rate for 2016-2020

For 2016-2020, GAWB proposes to use CPI to escalate capital expenditure. This is consistent with the QCA's recommendation for the previous regulatory period.

P.6.1.3 Analysis

Although we consider it to be preferable to link capital expenditure items more closely to specific indicators, as was previously proposed by GAWB in 2010, this may be unnecessary. Figure P.8 in the section on Operations, Maintenance and Other Expenditure illustrates that a more closely linked index, the PPI for non-residential construction, has grown at 2.6% - a rate slightly higher than, but comparable to, CPI over the five year period 2009 to 2014. Similarly, the PPI for Engineering Consulting Services (discussed above) has grown at 1.8% over the period.

P.6.1.4 Recommendation

Whilst more closely linked indicators are available, we consider that CPI is a suitable escalation rate for the mix of costs considered under capital expenditure. Key items likely to form a major component of capital expenditure, such as construction and consulting services costs, tend to increase at a rate similar to CPI.

P.7 Application of GAWB proposed escalation rates to opex and capex

P.7.1 Application to opex

We have reviewed GAWB's application of its escalation rates to the real opex budgets provided to us by GAWB, resulting in GAWB's submitted nominal opex budgets.

In one instance, for insurance costs, the data we have reviewed show an annual increase of 4.9% rather than GAWB's proposed 5% for each of the five years. We think this is because the 'claims excess' does not increase in GAWB's budget, resulting in an overall increase just under 5% p.a. We consider this to be acceptable.

We consider that generally GAWB has appropriately applied its recommended opex escalation rates in the provided budget spreadsheets. However, it is outside the scope of this engagement for us to review the application of escalation rates (if any) in the GAWB pricing model.

P.7.2 Application to capex

We have reviewed GAWB's application of its escalation rates to the real capex budgets provided to us by GAWB, resulting in GAWB's submitted nominal capex budgets.

We consider that GAWB has appropriately applied its recommended capex escalation rates in the provided budget spreadsheets. However, it is outside the scope of this engagement for us to review the application of escalation rates (if any) in the GAWB pricing model.

P.8 Conclusions

The findings of this review are summarised in Table P.15.

Table P.15: Comparison of GAWB's proposed and Jacobs' recommended escalation rates

Cost category	GAWB proposal	Jacobs recommendation	Change
Staffing costs	2016: 3.29%	2016: 3.3%	↔
	2017: 3.13%	2017: 3.5%	↑
	2018: 3.38%	2018: 3.5%	↑
	2019: 3.61%	2019: 3.8%	↑
	2020: 3.97%	2020: 3.8%	

	(Average: 3.5%)	(Average: 3.6%)	↓
Electricity	2016: 9.83% 2017: 9.82% 2018: 9.60% 2019: 6.25% 2020: 6.25% (Average: 8.4%)	2016: 3.5% 2017: 6.1% 2018: 4.2% 2019: 4.2% 2020: 4.2% [Average: 4.4%]	↓ ↓ ↓ ↓ ↓
Maintenance	2.5%	2.6%	↑
Chemicals	2.5%	2.7%	↑
Other expenditure	2.5%	2.5%	↔
Professional services	3.4%	1.8%	↓
Insurance	2016: 5.0% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 5.0%)	2016: 2.5% 2017: 5.0% 2018: 5.0% 2019: 5.0% 2020: 5.0% (Average: 4.5%)	↓ ↔ ↔ ↔ ↔
Regulatory fees	5.8%	Not proposed*	**n.a.**
Council rates	2.6%	5.0%	↑
All Capex items	2.5%	CPI[41]	↔

Note: * The purpose of the regulatory fees is to recover fixed regulatory costs, incurred predominantly by the QCA in 2015. This is more akin to an annuity. Therefore, we consider as reasonable any approach that recovers the efficient regulatory costs, in real terms, over the regulatory period.

Impact of key findings

For the largest cost category of staffing costs, which represents 47% of GAWB's proposed total opex during 2016-20, our slightly higher recommended escalation rates (on average) will not have a material impact over the regulatory period.

For the second largest cost category of electricity costs, which represents 10.8% of GAWB's proposed total opex during 2016-20, our lower recommended escalation rates (on average) may have a material impact on total electricity costs over the regulatory period. However, we consider that there are electricity cost savings available to GAWB in the market and that it would be in the GAWB's best interests (and for its customers) for GAWB to pursue those opportunities.

We have recommended minor increases to the escalation rates for maintenance, chemicals and council rates, which will result in immaterially higher opex in those categories, ceteris paribus, than GAWB has proposed.

On the other hand, we have recommended decreases to the escalation rates for professional services and insurance costs, which will result in immaterially lower opex in those categories, ceteris paribus, than GAWB has proposed.

We consider that GAWB has appropriately applied its recommended escalation rates in its budget spreadsheets. However, it is outside our scope to review the application of escalation rates within the GAWB pricing model.

[41] Whilst we refer to CPI as being the escalation rate, the technically accurate description is 'percentage changes in the CPI'. We have adopted the term 'CPI' instead of 'percentage changes in the CPI' for brevity.

We consider that GAWB has appropriately applied its recommended escalation rates in its budget spreadsheets. However, it is outside our scope to review the application of escalation rates in the GAWB pricing model.

P.9 References

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Appendix Q. Cost allocation

For its 2010 review, QCA GAWB's operating costs were allocated in the following categories

- Operations
- Maintenance
- Chemicals
- Electricity
- Other
- Staffing
- Insurance
- Rates

During the 2010-15 regulatory period, GAWB made the decision that its operating expenditure should be captured in a way that better reflects the way its business is operated. The new allocation method seeks to allocate cost by business function as opposed to activity which was the basis of the previous allocation method.

GAWB is of the opinion that the new approach will better support a more robust decision-making processes internally and provide greater transparency over GAWB's costs structure and related pricing model. The new functional reporting format is structured around four functional areas:

- Operations
- Asset life cycle management
- Strategy and asset creation
- Corporate services

These functions, based on the current organisational structure, overlap cost centres necessitating the development of a process to allocate costs to the functional areas. To ensure that the cost translation process from the original allocation to the new format was carried out consistently, a series of translation rules were defined. These are shown in Table Q.1.

Table Q.1: Functional definition

Function	Definition
Operations	The Operations function includes activities and inputs required to produce or provide a product. Activities include: • Storage • Delivery • Treatment • Hatchery
Asset life cycle management	The Asset Life Cycle Management function encompasses activities involved in managing and maintaining existing assets. Activities include: • Maintenance planning and execution • Condition assessments • Land management • Easement maintenance • Recreation area management • Maintenance of corporate assets ALCM costs include holding costs such as insurance and local government rates.

Function	Definition
Strategy and asset creation	The Strategy function includes activities necessary to meet strategic business positioning and corporate governance requirements while Asset Creation involves activities to develop and deliver GAWB's capital expenditure program. Activities include: • Board and CEO • Strategic planning • Economic regulation • New customer/business development • Pre-feasibility, scoping and planning • Non-capital creation and acquisition costs
Corporate services	The Corporate Support Services function entails activities that are required to support the functions and operations of the other activities (and cannot be directly allocated to a function). Activities include: • Finance • Procurement • HR • ICT • Legal • Provision of corporate facilities (excluding maintenance) • Other administration/reception

While most costs recorded in GAWB's general ledger could be readily allocated to the function for which they have been incurred, e.g. all chemicals and electricity are used in Operations; some costs required a more subjective assessment of the appropriate allocation. The employment costs of some employees fall into this allocation uncertainty area, e.g. the total employment cost of the Operations and Maintenance Manager. Costs such as this were allocated based on the individual's and management's assessment of the effort spent working on activities attributable to the functional area. While this subject allocation method may be less than ideal (albeit drawing on experience and judgement from those directly concerned), for a small organisation like GAWB this is considered by us to be appropriate as the cost of a more rigorous allocation method (e.g. based on timesheet or an activity based costing study) is likely to outweigh any benefits arising from a more accurate allocation method.

To test the consistency of its new cost allocation methodology, GAWB applied the cost definition rules to the 2010 QCA approved operation expenditure. Table Q.2 provides the summary of the QCA's 2010 final approved operating expenditure based on the previous and current allocation methods. It shows that the costs approved by the QCA for the 2010-2015 period based on the cost categories applied in the 2010 review has been translated to the new functional areas.

It also shows the actual expenditure incurred over the 2010-2015 period based on the current allocation method. Ideally, the comparison should also include an allocation of the actual costs incurred over the 2010-2015 period based on the previous allocation method. However GAWB was unable to provide this as such an allocation was not undertaken at the time the data was captured as it served no functional purpose for the organisation.

Table Q.2: Cost allocation comparison

QCA Approved ($000)	2011	2012	2013	2014	2015
Previous cost categories					
Operations	$1,409	$1,223	$1,070	$1,060	$1,093
Maintenance	$2,450	$2,107	$1,860	$2,428	$2,331
Chemicals	$847	$885	$925	$967	$1,011
Electricity	$1,286	$1,350	$1,476	$1,616	$1,768

QCA Approved ($000)	2011	2012	2013	2014	2015
Other	$2,150	$2,119	$2,096	$2,412	$2,586
Staffing	$5,878	$6,028	$6,222	$6,528	$6,849
Insurance	$696	$731	$767	$786	$805
Rates	$336	$354	$373	$392	$413
Sub-Total	**$15,052**	**$14,797**	**$14,789**	**$16,189**	**$16,856**
Cost pass through - Increase in QCA fees	$268	$288	$308	$330	$353
Total	**$15,320**	**$15,085**	**$15,097**	**$16,519**	**$17,209**
Current functional areas					
Operations	$4,870	$4,929	$5,077	$5,307	$5,618
Asset Life Cycle Management	$5,737	$5,406	$5,302	$5,989	$6,047
Strategy & Asset Creation	$3,070	$3,051	$3,023	$3,502	$3,660
Operations	$1,643	$1,699	$1,695	$1,721	$1,884
Total	**$15,320**	**$15,085**	**$15,097**	**$16,519**	**$17,209**
Actuals ($000) [42]					
Operations	$5,021	$5,706	$6,580	$6,918	$6,838
Asset Life Cycle Management	$6,267	$7,639	$7,445	$9,126	$8,566
Strategy & Asset Creation	$2,762	$3,641	$3,672	$3,793	$3,661
Corporate Services	$1,907	$1,748	$1,729	$1,700	$1,832
Total	**$15,957**	**$18,734**	**$19,426**	**$21,537**	**$20,897**

GAWB engaged PricewaterhouseCoopers (PwC) to review and audit the appropriateness of the functional reporting definitions and rationale, and to conduct a quality assurance check over the translation into the new functional definitions. In their review, PwC recommended the merger of two functional areas (Strategy and Asset Creation). Further PwC's quality assurance checks performed over the translation of GAWB's cost base into the four functional areas did not highlight any exceptions. The report concluded that "*to the extent that (PwC* was) *able to validate the calculations against source documentation, the translation rules applied to 2010 QCA Price Review Forecast and subsequent yearly cost baselines, appear to have been accurately and consistently applied in accordance with the proposed functional allocation methodology*."

PwC also indicated that "*methodology papers, including key assumptions, and other documentation reviewed clearly outlined the cost allocation process undertaken at GAWB and respective reconciliation to source data*". PwC noted that "*additional information was readily available to support the QCA efficiencies and further reallocation of General Ledger amounts into functional categories. Generally, GAWB work papers were clear, complete and included additional commentary for ease of reference. Data integrity checks have been embedded throughout the calculation worksheets to ensure accuracy. PwC could also easily trace the changes applied to convert the initial cost allocation from five functions into the final four categories."*

PwC stated that *"satisfactory explanations were also provided for the adjustments applied to transfer costs between functional categories to better align with the functional definitions."*

[42] 2015 figures are estimates.

Q.1 Documentation reviewed

The key reference documents used for this review are:

- PwC, *Functional Cost Allocation Review, Final report*, 28 August 2014 (Appendix H of GAWB, *2015 Price Monitoring Investigation, Submission to the Queensland Competition Authority*, Appendices Volume Two, September 2014)
- GAWB, Cost Allocation Methodology paper provided by GAWB
- Functional Reporting Translation Approach – 2010 Price Review forecast , paper provided by GAWB
- EDOCS_n286610_v1_Functional_opex_split_2011_to_2013_-_March_2014_pdf
- Compare functional splits original vs revised AO 3.11.2014 2011 to 2013.xlsx

Q.2 Jacobs assessment and conclusions

Our assessment reviews of the PwC and GAWB papers discussing the translation of GAWB's cost base into the four functional definitions did not reveal any areas of concern. We concur with PwC that the translation rules set by GAWB for the various cost items based on its General Ledger entries have been applied consistently. Based on the 2011 to 2013 years' data provided by GAWB to us, the costs have been applied in accordance with their functional allocation method. While individual cost items have exhibited significant annual movements e.g. relocation expenses increased over 10 fold in 2013, this was seen across all similar categories in the functional areas while other increases were due to the requirements of certain expenditure items in given functional areas e.g. legal assistance and insurance claims for operations. The large annual cost movements for individual cost items are in our opinion not unusual and their allocation has been treated consistently across the years and functional areas. The cost allocation of individual cost items over the 2011 to 2013 period is detailed in Table K.1.

From the above and from our analysis of the data we therefore conclude that the new cost allocation method is robust and, because the cost items as well as functional area costs are captured consistently, the process is able to be reconciled and compared with costs incurred in previous years and their allocation.

Table Q.3: 2011 – 2013 Cost allocation by functional categories

Cost Item	Strategy & Asset Creation			Operations			Asset Life Cycle Management			Corporate Services		
	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
Other income				-$118,862	-$69,782	-$72,901	-$307,052	-$321,034	-$338,064			
Additional Testing						$7,417						
Blue Green Algae Mon												
Environmental Compliance				$20,740	$15,998	$23,658						
Operations				$222,541	$135,363	$30,869						
Tradewaste Charges						$41,782						
ROP Monitoring				$95,092	$234,064	$115,087						
Safety				$62,244	$40,362	$43,537						
Stream Gauging				$31,961	$50,748							
Vegetation Rehabilitation				$60,440	$59,302	$57,316						
Water Quality Sample & Analysis				$127,663	$151,730	$172,978						
Broodstock Food				$3,425	$2,877	$3,164						
Broodstock Maintenance				$3,336	$13,102	$9,473						
Consumables				$17,905	$10,405	$470						
Fingerling Food					$181	$14,933						
Fingerling Production				$8,114	$18,939	$20,967						
Larval Food				$24,558	$16,737	$8,949						
Packaging Material				$1,463	$2,419	$3,885						
Salary Sacrifice Before Tax MV								-$16,649	-$54,455			
Fuel & Oil							$97,593	$128,289	$148,293			
Lease payments							$393,047	$464,185	$624,089			
MV Registration							$3,972	$4,488	$7,788			

Cost Item	Strategy & Asset Creation			Operations			Asset Life Cycle Management			Corporate Services		
	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
MV Repairs & Maintenance							$16,721	$10,021	$22,078			
SGIC costs												
Post Tax MV Contributions							-$44,599	-$60,308	-$74,065			
Emergency Maintenance									$39			
Fencing							$16,630	$26,523	$3,560			
Fire Management							$42,598	$30,422	$3,566			
Maintenance							$1,800,858	$2,321,265	$1,531,013			
Weed & Pest Animal Management							$30,618	$56,788	$53,789			
Inventory Adjustments												
Electricity				$1,333,765	$1,599,411	$1,867,090	$16,063	$19,262	$22,486	$72,473	$52,349	$50,825
Chemicals				$553,951	$640,059	$747,314						
FBT	$37,532	$40,619	$73,337	$24,010	$25,985	$46,915						
Staff Training 1	$48,344	$18,268	$19,202	$111,654	$149,638	$120,077	$42,555	$12,612	$4,936	$52,592	$52,720	$74,232
Conference Expenses	$7,294	$21,610	$3,391	$15,240	$11,877	$1,090		$6,500	$4,469	$4,384	$4,729	$4,441
Labour Hire	$25,655	$189,918	$73,564	$49,073	$51,471	$243,942	$7,838	$34,596	$95,390	$39,056	$61,992	$47,062
Other	$1,260	$1,242	$5,110	$2,216	$2,107	$9,509	$3,105	$3,315	$13,119	$981	$878	$3,225
Relocation Expenses	$1,263	$249	$3,386	$2,220	$422	$6,302	$3,111	$664	$8,694	$983	$176	$2,137
Recruitment	$24,621	$13,223	$15,363	$43,300	$22,424	$28,592	$60,676	$35,282	$39,444	$19,176	$9,347	$9,696
Rent Paid							$58,021	$33,076	$118,831			
Staff Uniforms	$4,693	$4,960	$5,217	$8,254	$8,412	$9,709	$11,566	$13,235	$13,393	$3,655	$3,506	$3,292
Staff Welfare	$4,009	$3,364	$4,053	$7,050	$5,705	$7,542	$9,879	$8,977	$10,405	$3,122	$2,378	$2,558
Staff Rental Assistance			$3,038			$3,685			$2,605			$8,544
Health & Wellbeing												

Cost Item	Strategy & Asset Creation			Operations			Asset Life Cycle Management			Corporate Services		
	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
Employee assistance												$220
Control System Support Charges	$3,819	$2,912	$1,836	$6,716	$4,938	$3,416	$9,411	$7,769	$4,713	$2,974	$2,058	$1,159
Software Maintenance (non-contract)	$17,386	$19,633	$18,784	$30,576	$33,294	$34,957	$42,846	$52,386	$48,225	$13,541	$13,878	$11,855
Specialist Support	$19,571	$34,389	$35,085	$34,419	$58,318	$65,295	$48,231	$91,759	$90,076	$15,243	$24,309	$22,143
Internet/Videoconferencing	$3,453	$6,633	$16,810	$6,072	$11,249	$31,284	$8,509	$17,699	$43,157	$2,689	$4,689	$10,609
Hardware & Peripherals												
Accounting Advice										$57,765	$12,740	
Asset Valuation								$1,000	$1,000			
Audit Fees - Compliance				$10,946	$25,033	$3,075						
Audit Fees - External										$47,268	$48,786	$47,150
Audit Fees - Internal	$45,921	$53,798	$46,215	$45,921	$53,798	$46,215	$45,921	$53,798	$46,215	$45,921	$53,798	$46,215
Consulting Services	$135,974	$423,011	$204,193	$71,082	$85,383	$196,162		$84,491	$57,840	$10,646	$16,590	$22,771
Legal Advice	$61,634	$82,768	$60,995		$5,375	$52,623		$26,351	$57,241	$80,869	$55,915	$117,476
Legal Advice - Non Deductible										$97		
Pricing Matters	$504,838	$438,810	$462,327									
Professional Services-Engineer	$329,460	$255,168	$302,731	$50,395	$47,281	$74,801	$162,472	$269,160	$134,253			
Tax Advice										$32,460	$35,860	$40,500
Survey Expenses				$18,382	$7,890	$4,435						
Insurance Expense							$529,962	$644,800	$712,915	$98,799	$53,948	$55,077
Insurance Excess Claim							$1,000	$1,818	$50,455			
Rates							$246,640	$239,333	$239,699			
Accommodation & Travel	$96,057	$144,045	$153,771	$8,586	$5,875	$11,022	$47	$1,814	$7,662	$6,931	$10,565	$8,979
Advertising								-$1		$600	$13,570	$2,623

Cost Item	Strategy & Asset Creation			Operations			Asset Life Cycle Management			Corporate Services		
	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
Bad & Doubtful Debts				$331	$1,705	$134						
Cleaning & Waste Removal							$65,853	$93,148	$89,488			
Community Relations										$4,515	$10,390	$693
Entertainment deductible											$37	$103
Entertainment non-deductible										$6,103	$10,385	$8,027
Licences, Fees, Permits & Land	$3,537	$2,912	$773	$10,607	$3,391	$6,335	$3,022	$7,242	$5,257	$2,058	$2,786	$6,081
Meeting Expenses	$16,263	$12,226	$3,769									
Other Expenses											-$2,431	$420
Printing	$10,607									$48,672	$53,984	$48,684
Postage & Freight										$13,670	$11,115	$15,136
QA Certification & Maintenance												
Search Fees										$2,012	$1,460	$622
Security Services										$8,735	$10,126	$19,855
Sponsorships & Donations										$36,355	$10,030	$1,914
Stationery										$21,910	$18,376	$19,743
Subscriptions & Publications	$70,703	$45,033	$52,073	$7,898	$29,111	$7,424	$12,013	$32,112	$11,158	$25,394	$25,753	$57,979
Telephone	$3,192	$4,443	$4,081	$29,285	$40,764	$37,450	$8,838	$12,303	$11,302	$48,825	$67,964	$62,437
Lease Payments-Buildings/Land							$153,382	$94,578	$195,730			
Records Management												
Pooled Asset Purchases	$3,974	$37,854	$16,974	$37,823	$71,387	$70,690	$33,771	$61,452	$41,302	$38,194	$38,867	$12,515
Minor Assets ($1000 to $5000)	$4,826	$17,976		$55,994	$138,963	$99,336	$45,431	$106,164	$63,888	$55,051	$42,582	$30,102
TEC allocation	$1,276,121	$1,766,003	$2,086,339	$1,765,596	$1,812,573	$2,189,107	$2,279,473	$2,607,520	$2,933,631	$983,765	$910,977	$851,947
Total Operating Expenses	**$2,762,005**	**$3,641,068**	**$3,672,419**	**$4,901,984**	**$5,636,285**	**$6,507,111**	**$5,960,024**	**$7,318,203**	**$7,106,607**	**$1,907,486**	**$1,747,180**	**$1,729,044**