



## **Draft Report**

# **Gladstone Area Water Board: Investigation of Contingent Water Supply Strategy Pricing Practices**

## **Part B**

**July 2008**

Level 19, 12 Creek Street Brisbane Queensland 4000  
GPO Box 2257 Brisbane Qld 4001  
Telephone (07) 3222 0555  
Facsimile (07) 3222 0599

[general.enquiries@qca.org.au](mailto:general.enquiries@qca.org.au)  
[www.qca.org.au](http://www.qca.org.au)

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## SUBMISSIONS

**This is a draft report and is subject to revision.**

Public involvement is an important element of the decision-making processes of the Queensland Competition Authority (the Authority). Therefore submissions are invited from interested parties concerning its assessment of Gladstone Area Water Board: Investigation of Contingent Water Supply Strategy Pricing Practices. The Authority will take account of all submissions received.

Written submissions should be sent to the address below. While the Authority does not necessarily require submissions in any particular format, it would be appreciated if two printed copies are provided together with an electronic version on disk (Microsoft Word format) or by e-mail. Submissions, comments or inquiries regarding this paper should be directed to:

Queensland Competition Authority  
GPO Box 2257  
Brisbane Qld 4001  
Telephone: (07) 3222 0555  
Fax: (07) 3222 0599  
Email: [gawb.investigation@qca.org.au](mailto:gawb.investigation@qca.org.au)

The **closing date** for submissions is 1 September 2008.

### Confidentiality

In the interests of transparency and to promote informed discussion, the Authority would prefer submissions to be made publicly available wherever this is reasonable. However, if a person making a submission does not want that submission to be public, that person should claim confidentiality in respect of the document (or any part of the document). Claims for confidentiality should be clearly noted on the front page of the submission and the relevant sections of the submission should be marked as confidential, so that the remainder of the document can be made publicly available. It would also be appreciated if two copies of each version of these submissions (i.e. the complete version and another excising confidential information) could be provided. Again, it would be appreciated if each version could be provided on disk. Where it is unclear why a submission has been marked “confidential”, the status of the submission will be discussed with the person making the submission.

While the Authority will endeavour to identify and protect material claimed as confidential as well as exempt documents (within the meaning of the *Freedom of Information (FOI) Act 1989*), it cannot guarantee that submissions will not be made publicly available. As stated in s187 of the *Queensland Competition Authority Act 1997* (the QCA Act), the Authority must take all reasonable steps to ensure the information is not disclosed without the person’s consent, provided the Authority is satisfied that the person’s belief is justified and that the disclosure of the information would not be in the public interest. Notwithstanding this, there is a possibility that the Authority may be required to reveal confidential information as a result of an FOI request.

### Public access to submissions

Subject to any confidentiality constraints, submissions will be available for public inspection at the Brisbane office of the Authority, or on its website at [www.qca.org.au](http://www.qca.org.au). If you experience any difficulty gaining access to documents please contact the office (07) 3222 0555.

Information about the role and current activities of the Authority, including copies of reports, papers and submissions can also be found on the Authority’s website.

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**PREAMBLE**

To accommodate unforeseen demand and supply variations, the Gladstone Area Water Board (GAWB) is developing a contingent supply strategy, in three parts, namely:

- (a) recovery of preparatory expenditure on a preferred supply augmentation;
- (b) establishing criteria for triggering the implementation in the event of drought or unexpected increases in demand; and
- (c) pricing for water supply once the augmentation is completed.

This report addresses Part (b). The Ministers have accepted the Authority's report on Part (a). GAWB has yet to make a submission for Part (c).

GAWB has proposed separate criteria for triggering augmentation in response to drought and augmentation in response to unexpected additional demand. It has also proposed a staged process for planning, consultation and evaluation of alternative responses.

The Authority considers that GAWB's proposals are generally appropriate. However, for a number of issues the Authority has arrived at different conclusions, which warrant further submissions from GAWB and its customers.

- GAWB has proposed the same triggers for supply augmentation as for the imposition of supply restrictions. Given the difference between the costs of augmentation and of supply restrictions, different triggers that impose supply restrictions before initiating supply augmentation seem appropriate.
- According to the Authority's modelling, the probability of GAWB's proposed inflow assumption materialising is less than one in 2000. Other assumptions would also achieve GAWB's stated objectives. For example, adopting an assumption that has one chance in 200 of materialising would allow construction to be deferred and allow more time for rain to occur. Should inflows turn out to be lower than this assumed level, sufficient time would still be available to trigger augmentation and defer dam failure by at least two years. Ultimately, however, determination of the appropriate inflow assumption is a matter for customers and other stakeholders. As demand estimates and inflow experience will change over time, GAWB and its customers should periodically review inflow assumptions.
- Rather than the 5% proposed by GAWB, a 3% allowance for distribution losses appears appropriate, as this is consistent with GAWB's current experience and is noted as a target in its System Leakage Management Plan.
- GAWB's 5% contingency reserve seems unnecessary, since variations in existing customers' demand can be managed under contracts with those customers and/or by using excess capacity. Moreover, historical data provide no evidence of actual demand exceeding contracted demand. Given the relatively short lead time and significant supply volume of the proposed Fitzroy pipeline, a contingency reserve would in effect be doubling up on the currently proposed contingent supply strategy, adding unnecessarily to service costs.
- While generally supporting the processes proposed by GAWB, the Authority considers that a consultation time of 120 days is more appropriate than the proposed 60-day period and that notice to customers should be widened to invite feedback on the timing of the triggers taking account of the most recent inflow data, supply information and estimates of demand.

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**GLOSSARY**

ACTEW	ACTEW Corporation Limited (ACT)
AHD	Australian Height Datum
BOM	Bureau of Meteorology
CPM	Callide Power Management
CQRWSS	Central Queensland Regional Water Supply Strategy
CSE	CS Energy
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	Community Service Obligation
DBCT	Dalrymple Bay Coal Terminal
DMP	Drought Management Plan
DNRW	Department of Natural Resources and Water
DSE	Department of Sustainability and Environment (Victorian Government)
EL	Elevation Level
ERA	Economic Regulation Authority (WA)
ESC	Essential Services Commission (VIC)
ESCOSA	Essential Services Commission of South Australia (SA)
FOI	Freedom of Information
GAWB	Gladstone Area Water Board
GL	Gigalitre
GOC	Government Owned Corporation
HNFY	Historical No Fail Yield
ICRC	Independent Competition and Regulatory Commission (ACT)
IPART	Independent Pricing and Regulatory Tribunal (NSW)
LOS	Level of Service
ML	Megalitre
NPV	Net Present Value
NWC	National Water Commission
NWI	National Water Initiative
Ofwat	Office of Water Services, UK
QAL	Queensland Alumina Limited
QCA	Queensland Competition Authority
QCA Act	Queensland Competition Authority Act (1997)

QWC	Queensland Water Commission
ROP	Resources Operations Plan
RTA	Rio Tinto Alcan
SCADA	Supervisory Control and Data Acquisition
SEQ	South East Queensland
SLMP	System Leakage Management Plan
SMEC	Snowy Mountains Engineering Corporation
SWP	Strategic Water Plan
Synergies	Synergies Economic Consulting
the Authority	The Queensland Competition Authority

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## SUMMARY OF CONCLUSIONS

### Criteria for Drought Triggers

GAWB has proposed the following criterion for triggering augmentation in response to drought:

*‘to enable the appropriate augmentation to commence operations in sufficient time to avoid emergency restrictions and defer supply failure for a target period (currently two years), after allowing for inflows, losses, current and contracted future demand, and other forecasts as set out in the Drought Management Plan (DMP)’.*

In regard to the objectives underlying GAWB’s criterion, the Authority concludes that:

- avoidance of emergency restrictions is a relevant objective for triggering construction on the assumption that augmentation is the appropriate response to a drought; and
- any response, including augmentation, should seek to defer dam failure. While GAWB has not substantiated the basis of its two-year target period, factors such as the probability of continuing low inflows and the scale and cost of the particular augmentation option adopted are relevant and may indicate that an alternative period is more appropriate.

In regard to the assumptions supporting the timing for triggering augmentation, the Authority concludes that the factors identified by GAWB are all relevant (and should also take into account distribution losses). However, on a number of issues, the Authority has arrived at different conclusions:

- GAWB has proposed the same triggers for supply augmentation as for the imposition of supply restrictions. Given the difference between the costs of augmentation and of supply restrictions, different triggers that impose supply restrictions before initiating supply augmentation seem appropriate;
- GAWB’s proposed inflow assumption implies that the three-year worst consecutive average inflows will continue for five years or more. According to the Authority’s modelling, the probability of this materialising is less than one in 2000. Other assumptions could achieve GAWB’s stated objectives. For example, adopting an assumption that has one chance in 200 of materialising would allow construction to be deferred until absolutely necessary and allow more time for rain to occur. Should inflows turn out to be lower than this assumed level, sufficient time would still be available to trigger augmentation and defer dam failure by at least two years;
- Ultimately, determination of the appropriate inflow assumption is a matter for customers and other stakeholders. Furthermore, as demand estimates and inflow experience will change over time, GAWB and its customers should periodically review inflow assumptions;
- GAWB’s proposed approach in regard to storage losses (evaporation and seepage losses) is appropriate and consistent with industry benchmarks for similar storages, but distribution system losses should also be recognised in the drought response trigger.

The Authority also concludes that the DMP should be amended to reflect the Authority’s other conclusions.



## Criteria For Unexpected Additional Demand Triggers

GAWB's criterion for augmentation in response to unexpected additional demand is:

*“to trigger construction of the appropriate augmentation when GAWB has entered into contracts with customers that exceed the capacity of its water sources, after allowing for distribution losses and contingency”.*

GAWB's criterion is considered appropriate as it seeks to ensure adequate supply to meet demand. GAWB recognises the need for demand to be underpinned by contracts in order to justify costly augmentation and allow GAWB to recover its costs.

In relation to the assumptions underpinning GAWB's criterion, the Authority concludes that:

- supply capacity is a relevant assumption and should reflect the amount of water available for supply, presently the current interim historical no fail yield (HNFY) of 70,000ML, as set by Department of Natural Resources and Water (DNRW);
- rather than the 5% allowance proposed by GAWB, an allowance of 3% of distributed volume for system losses seems appropriate. Such a level is consistent with the apparent level of losses currently being recorded by GAWB and noted as a target objective in GAWB's System Leakage Management Plan. A more holistic approach to addressing system losses would also include losses from the reticulation system operated by Gladstone Regional Council; and
- GAWB's proposed reserve of 5% of HNFY seems unnecessary as:
  - variations in existing customers' demand can be managed under contracts with those customers and using excess capacity. Available historical data provides no evidence of actual demand exceeding contracted demand to justify a contingency reserve;
  - given the relatively short lead time and significant supply volume of the proposed Fitzroy pipeline, a contingency reserve is not necessary to be included in the augmentation trigger at this time; and
  - an ex-post response to a downgrade in hydrology is more appropriate way of managing this risk than a permanent downgrade through a contingency reserve.

## Review of GAWB's Proposed Process

In its initial submission to the Authority, GAWB proposed a general process to be applied when assessing the appropriate response to drought or unexpected additional demand. The Authority considers that GAWB's proposed process is reasonable for general application.

GAWB's proposed process and the Authority's conclusions are:

- *Planning* - the Authority accepts GAWB's proposed process of five-yearly reviews of strategic water plans and an adaptive and consultative management approach involving annual updates if required;
- *Notice* – the Authority considers that the proposed nature of the notice is appropriate. In regard to drought, the notice to customers should be widened to invite customer feedback taking account of the latest inflow data, supply information, and most recent demand forecasts;
- *Customer responses* - the Authority considers that up to 120 days should be allowed to provide sufficient time for customers to prepare detailed responses and for GAWB to then analyse

options and have up to six months lead time to undertake any necessary preparatory work and reach contractual agreement;

- *Evaluation and option selection* - The Authority considers that the process should require customers to provide any submissions which could forestall the need for augmentation in a cost effective manner. The Authority also considers that GAWB should undertake a broader analysis of the relevant options and, if necessary, provide relevant details to Ministers for consideration as to whether a less-commercial option may be warranted. The analysis should be supported by an net present value (NPV) of the commercial benefits of each option. Where Ministers propose that GAWB undertake a less-commercial option then GAWB should be provided with a relevant community service obligation (CSO). Otherwise, GAWB should implement the most commercially beneficial option;
- *Ex-ante evaluation* – In regard to GAWB’s request for the Authority to provide guidelines that could be employed as part of an ex-ante approval process the Authority notes that:
  - the previously approved review trigger arrangements may apply where the investment results in an increase in aggregate revenue greater than 15%. However, a Ministerial Direction would be required to allow the Authority to proceed;
  - guidelines have been provided in some of the Authority’s previous reviews. However, the Authority cannot give binding ex-ante guidelines under Part 3 of the QCA Act 1997; and
- *Construction trigger* - The Authority accepts that it is GAWB’s responsibility to demonstrate compliance with the process leading up to the construction trigger.

## 1. BACKGROUND

*The Authority has been directed by the Ministers to review the appropriateness of the Gladstone Area Water Board's (GAWB's) proposed contingent supply strategy and associated pricing practices, in three parts, namely: (a) the recovery of proposed preparatory expenditure; (b) the criteria for triggering construction of the appropriate augmentation; and (c) the proposed changes to pricing to recover the efficient costs for augmentation.*

*This Draft Report relates to Part (b) of the investigation.*

*In its 2005 investigation, the Authority recommended that a price review should be triggered if there was, or was expected to be, a sustained variation of 15% or more in GAWB's aggregate revenue (QCA, 2005:151). GAWB's proposed contingent supply strategy, and constituent parts (comprising the proposed criteria and process), provide a more detailed framework for determining when new augmentation can be reasonably expected to be required for previously unplanned events such as droughts or additional demand.*

### 1.1 Introduction

As part of its strategic water planning, GAWB has developed a preferred contingent supply strategy which entails the sourcing of additional water, which may be required to address drought or unexpected demand, from the Fitzroy River near Rockhampton.

For this purpose, GAWB has proposed to undertake preparatory expenditure to attain reasonable certainty that water can be sourced from the Fitzroy River within 24 months of agreed events (either drought or demand-led) that might require supply augmentation. GAWB also proposes to incur some expenditure on alternative potential supply strategies such as desalination.

### 1.2 The Scope of the Current Investigation

#### *The Ministerial Direction*

On 23 February 2007, the Premier and the Treasurer (the Ministers), pursuant to section 23 of the *Queensland Competition Authority Act 1997* (the QCA Act), referred the declared government monopoly business activities of GAWB to the Authority for investigations regarding the appropriateness of the following pricing practices:

- (a) GAWB's recovery of proposed preparatory expenditure from existing and future customers, specifically having regard to:
  - (i) the prudence of GAWB's contingent source strategy, including selection of a supply from the Fitzroy River as the appropriate contingent source;
  - (ii) the level of efficient costs associated with the development of GAWB's contingent supply strategy that should be included in prices;
  - (iii) the timing of expenditures which are related to the implementation of the contingent supply strategy; and
  - (iv) the means by which efficient costs of the contingent supply strategy should be included in prices for subsequent years;
- (b) GAWB's proposed criteria for triggering construction of the appropriate augmentation in the event of drought or unexpected additional demand; and

- (c) GAWB's proposed changes to pricing practices related to declared activities required to enable GAWB to recover its efficient costs of the system as appropriately augmented.

#### *Scope of Current Investigation*

This Draft Report relates solely to Part (b) of the Ministerial Direction.

The Ministers have already accepted the Authority's Final Report in respect of Part (a).

#### *Timing Issues*

Under the Ministerial Direction, the Authority was directed to:

- consult with GAWB, GAWB's customers and other relevant stakeholders;
- provide a Draft Report on the investigation within 120 days of receiving notification of GAWB's proposed criteria for triggering implementation, with the Final Report to be provided within 60 days of the Draft Report; and
- consult with the Queensland Water Commission (QWC) in regard to any implications the findings of its investigations may have for pricing practices in South East Queensland (SEQ).

The required timelines are subject to the receipt of information acceptable to the Authority and its consultants, any subsequent changes agreed to between the Authority and GAWB, and exclude nominated consultation periods.

On this basis, the Authority's Draft Report in respect of Part (b) of the investigation was due no later than 30 July 2008.

### **1.3 GAWB**

#### *Charter*

GAWB is responsible for the supply of raw and treated water to industrial and local government customers in the Gladstone area. It operates as a commercialised statutory authority and, under the *Water Act 2000*, is required to be commercially successful in its business activities and efficient and effective in providing goods and services, including community service obligations (CSOs).

#### *Overview of GAWB's Business*

An overview of GAWB's business activities is outlined in the Authority's Final Report relating to Part (a) of the investigation. Key salient features of particular relevance to Part (b) of the investigation are as follows:

- Awoonga Dam has a storage capacity of 770,000ML. GAWB is currently restricted to supplying no more than 70,000ML per year under its Water Resource Plan;
- GAWB currently supplies approximately 55,000ML per year to existing customers. Supplies to power stations in the Callide Valley comprise approximately 40% of total demand. Rio Tinto Alcan (RTA), Gladstone Power Station, Orica, Queensland Alumina Limited (QAL) and Boyne Smelters account for a further 40%. Residential and

commercial customers within the Gladstone Regional Council (including Calliope) account for the remaining 20%;

- GAWB's pricing policy has evolved since its inception, reflecting changes in funding requirements and Government policy over that period. GAWB has advised that customers are being transitioned to long term contracts consistent with the pricing principles previously proposed by the Authority and accepted by the Government;
- Specific customer requirements are incorporated into the terms of the agreement through commercial negotiation. The key elements of GAWB's standard product offering (as reflected in new contracts) include:
  - while GAWB currently supplies its customers exclusively with water from Awoonga Dam, the contracts provide that, at GAWB's discretion, one or more additional sources of water of comparable quality can be sourced;
  - the Reservation Volume, which is the customer's best estimate of water it will consume in that financial year, is the contracted amount that forms the basis of fixed charges payable by customers. Customers can reduce or increase their Reservation Volume in accordance with mechanisms contained within the agreement;
  - customers can trade water that is not required within their Reservation Volume, subject to the reasonable consent of GAWB; and
- customers ultimately bear the economic risk of supply shortage caused by falling levels of water storage arising from drought, but GAWB has certain obligations and rights both under the contract and the *Water Act 2000*. Under the *Water Act 2000*, GAWB is required to: commercially manage its affairs; plan and deliver future water supply capacity, develop the treated and untreated water delivery system; manage water quality and manage the water distribution system; and
- GAWB has in place a Drought Management Plan (DMP) which is triggered five years from failure given assumptions about projected demand and inflows. The DMP assumes that demand is set at current and future contracted demand and future inflows are limited to the worst three-year average (estimated at 23,633ML per year). The low supply alert is triggered five years before failure and, for the first 12 months, involves only voluntary restrictions. Restrictions of 10% apply four years before dam failure and only new contracts entered into within 30 days of this restriction will be considered. Emergency restrictions are applied for the last six months before failure and involve 50% restrictions for municipal customers, and a total water ban for all other customers (including industry).

### *Recent History*

Recent events relevant to GAWB's pricing practices were outlined in the Authority's Part (a) Final Report. In brief:

- In September 2000, the Ministers directed the Authority to undertake an investigation of GAWB's pricing practices. In its 2002 Final Report, *Gladstone Area Water Board: Investigation of Pricing Practices*, the Authority recommended pricing practices for GAWB which were accepted by the Ministers;

- In April 2004, the Ministers directed the Authority to again investigate GAWB's pricing practices, particularly in response to changes in hydrology, demand and drought management arrangements. The Ministers broadly accepted the Authority's recommendations outlined in its 2005 Final Report; and
- GAWB has recently reviewed its inflow assumptions following the 2006/07 wet season and has amended its previous Drought Management Plan (DMP). GAWB's change to a more conservative inflow assumption based on the worst consecutive three-year sequence on record rather than the worst 10-year sequence has significant implications for the timing of augmentation.

#### **1.4 Part (a) - GAWB's Contingent Supply Strategy**

GAWB's preferred contingent supply strategy was identified in Part (a) of the investigation as a pipeline between the Lower Fitzroy River and the proposed Aldoga Reservoir (the Fitzroy Pipeline).

The Fitzroy Pipeline option involves a 105km pipeline, originating upstream of the Fitzroy River Barrage. GAWB in its submissions focussed upon evaluating a pipeline with a capacity of 30,000ML per year. It included associated pump stations, water treatment plant (at the Fitzroy end), a terminal reservoir at Aldoga and costs associated with future storage infrastructure on the lower Fitzroy River.

GAWB submitted that, under the Central Queensland Regional Water Supply Strategy (CQRWSS), it has a reserved volume of 30,000ML per year from the lower Fitzroy, to be sourced from the raising of the existing Eden Bann weir and/or a new weir at Rookwood Crossing, with construction scheduled for completion by 2011.

In the event water was required before these weirs are completed, GAWB expected to be able to source water from the Fitzroy River. Alternatively, GAWB indicated that it may be possible to fast-track the construction of the weirs for completion by mid to late 2010.

The Authority's conclusions in regard to GAWB's Part (a) proposals were that:

- drought is the key imminent risk for GAWB and its customers;
- demand risk is not an imminent concern for GAWB, while hydrology is a long term risk where the magnitude or timing of any future adjustment (if any) to historical no fail yield (HNFY) remains uncertain;
- it is prudent for GAWB to continue working towards implementing the Fitzroy Pipeline option due to the possibility of even lower inflows, or failure of inflows, in the (then) coming wet season;
- under the worst case scenario postulated by GAWB, that inflows would be limited to the worst three-year average, there was time to undertake further investigations of other options such as desalination, air and sea water cooling and alternative supply restrictions before committing to the Fitzroy Pipeline option;
- preparatory expenditures on items such as project management, approvals, consultation and communication, engineering and investigations and land acquisition were appropriate if there was a high probability of project commencement in the next few years. However, asset creation should be deferred, except where demonstrated to be necessary;

- GAWB should ensure that there was a significant level of customer support for the preferred option before proceeding with significant asset creation expenditure;
- the levels of preparatory expenditure should be subject to ex-post review;
- efficient preparatory costs should be taken into account when determining prices at the next regulatory reset;
- depreciation of efficient preparatory expenditure should not commence until the assets were commissioned or, if it was certain that assets would not be commissioned because of changing circumstances, when that decision was taken; and
- preparatory costs should not be optimized out of the asset base without compensation.

It is particularly noted that the Authority also recommended that the demand-supply situation should be kept under review and the level and timing of expenditure on the Fitzroy Pipeline should be reconsidered if circumstances allowed more time to review other options.

In regard to process, the Authority recommended that GAWB should develop a detailed execution schedule for the proposed preparatory works, and that this schedule should be provided to customers for comment.

GAWB had already incurred some preparatory costs, and proposed to complete preparatory works by mid to late 2008.

The Ministers' decision to accept the Authority's recommendations, without qualification, was gazetted on 14 March 2008.

#### *Changed Drought Circumstances*

Since the Authority's Final Report in respect of the Part (a) investigation, significant changes have occurred in relation to GAWB's drought circumstances.

Following significant rainfall during February 2008, Awoonga Dam reached 34.43 Australian Height Datum (AHD), which is equivalent to 59.08% of total capacity. On 3 September 2007, Awoonga Dam was at only 29.88 AHD or 36% of total capacity.

GAWB has subsequently withdrawn a low supply alert previously issued and advised that the timetable initially proposed to meet a construction trigger of October 2008 no longer applies.

Under GAWB's base case demand scenario, as at 1 May 2008, Awoonga Dam is now 78 months from failure, 18 months from a Low Supply Alert and 30 months from triggering construction of the 30GL per year Fitzroy Pipeline drought response. On GAWB's base case demand and supply projections, the triggering of a drought augmentation is now deferred until October 2010.

A particular implication of this changed scenario is that GAWB now has more time to examine other options to the Fitzroy Pipeline, including desalination and demand management proposals from customers.

## 1.5 Part (b) - GAWB's Proposed Criteria

The Ministerial Direction for Part (b) of the investigation requires the Authority to investigate the appropriateness of GAWB's proposed criteria for triggering construction of the appropriate augmentation in the event of drought or unexpected additional demand.

The Authority has adopted the Australian Oxford Dictionary meaning of a criterion as being *a principle or standard by which a thing is judged* as a basis for its assessment of GAWB's submission. Further, the Authority has defined a trigger as *an event or occurrence which sets off an action or process*, which in this case is a supply augmentation.

That is, the Authority has sought to identify criteria, or rules or conditions, which must be satisfied before GAWB may commence augmentation.

On 21 December 2007, the Authority received GAWB's submission *Gladstone Area Water Board: Submission to the Queensland Competition Authority, Fitzroy River Contingency Infrastructure Part (b) Augmentation Triggers*.

Following the release of its submission to Part (b) of the investigation, GAWB submitted on 30 January 2008 that, in response to drought:

*GAWB's proposed criterion to trigger construction is to enable the appropriate augmentation to commence operations in sufficient time to avoid emergency restrictions and defer supply failure for a target period (currently two years), after allowing for inflows, losses, current and future contracted demand, and other forecasts as set out in the Drought Management Plan.*

GAWB noted that the application of the criterion was intended to be both generic and specific to the current drought as indicated in Table 1.1.

**Table 1.1 Application of Criterion for Drought Trigger**

<i>Item</i>	<i>Generic application</i>	<i>Application in the current drought</i>
Appropriate Augmentation	The augmentation determined as a result of the process set out in Section (c) of GAWB's submission.	The Gladstone-Fitzroy Pipeline with a capacity of 3OGL per annum (subject to customers submitting alternative proposals that will defer or avoid the need for this augmentation).
Sufficient time	A reasonable period of time to develop, commission and make operational the appropriate augmentation to enable supply to GAWB's customers, including reasonable allowance for project delivery risks and the costs and benefits of fast-tracking.	Two years.
Target period	As described in GAWB's Drought Management Plans as amended or revised from time to time.	Extension of supply by at least two years, as described in chapter 3 of GAWB's submission.
Storage inflows and loss assumptions used to calculate the time to supply failure	The inflows and losses set out in GAWB's Drought Management Plan, as amended or reviewed over time.	The inflows and losses set out in GAWB's current Drought Management Plan – i.e. inflows of 23,633ML per annum.



GAWB also submitted that, in response to unexpected additional demand:

*GAWB's proposed criterion to trigger construction of the appropriate augmentation is when GAWB has entered into contracts with customers that exceed the capacity of its water sources, after allowing for distribution losses and contingency.*

## **1.6 Related Existing Regulatory Arrangements**

Existing regulatory arrangements approved by the Ministers subsequent to the Authority's 2005 investigation are relevant to the consideration of criteria to trigger an augmentation.

In the 2005 investigation, the Authority recommended that a price review should be triggered if there was, or was expected to be, a sustained variation of 15% or more in GAWB's aggregate revenue (QCA, 2005:151). A sustained variation was considered to be a permanent change which has occurred, or was expected to occur with a high degree of certainty, such as significant demand changes (QCA, 2005:155). The Authority's recommendation was subsequently accepted by the Ministers.

GAWB's proposed contingent supply strategy, including the proposed criteria and process, provide a more detailed framework for determining when new augmentation can be reasonably expected to be required for previously unplanned events such as droughts or additional demand. While it is possible that the finally preferred option may not increase GAWB's aggregate revenue requirement by more than 15% and therefore may not trigger a review of prices, an augmentation such as the Fitzroy Pipeline would. The Authority would need to be directed by the Ministers to commence such a review, most likely in response to a request by GAWB.

## **1.7 Approach to the Investigation**

In undertaking the current investigation, the Authority has:

- released GAWB's submission in relation to Part (b) of the investigation for comment;
- taken into consideration all customer and stakeholder submissions, including further submissions from GAWB in response to stakeholder submissions;
- commissioned advice from independent consultants on relevant technical issues;
- consulted with GAWB, GAWB's customers and all other relevant stakeholders to gain further understanding of matters relevant to the investigation; and
- consulted with the Queensland Water Commission (QWC) in regard to any findings in this investigation that had potential implications for pricing practices in South East Queensland.

## **1.8 Structure of the Report**

The Draft Report is structured as follows:

- Chapter 1 – Background;
- Chapter 2 – Criteria for Drought Triggers;
- Chapter 3 – Criteria for Unexpected Additional Demand Triggers; and

- Chapter 4 – Review of GAWB’s Proposed Process.

## **1.9 Other Issues**

Under section 26 of the QCA Act, the Authority must have regard for a variety of matters including consumer protection, the costs of services, demand management and social welfare considerations to name a few. Any of these matters deemed relevant to the Authority’s decision have been taken into account throughout the Authority’s deliberations.

## 2. CRITERIA FOR DROUGHT TRIGGERS

GAWB has proposed the following criterion for triggering augmentation in response to drought:

*‘to enable the appropriate augmentation to commence operations in sufficient time to avoid emergency restrictions and defer supply failure for a target period (currently two years), after allowing for inflows, losses, current and contracted future demand, and other forecasts as set out in the Drought Management Plan (DMP)’.*

*In regard to the objectives underlying GAWB’s criterion, the Authority concludes that:*

- *avoidance of emergency restrictions is a relevant objective for triggering construction on the assumption that augmentation is the appropriate response to a drought; and*
- *any response, including augmentation, should seek to defer dam failure. While GAWB has not substantiated the basis of its two-year target period, factors such as the probability of continuing low inflows and the scale and cost of the particular augmentation option adopted are relevant and may indicate that an alternative period is more appropriate.*

*In regard to the assumptions supporting the timing for triggering augmentation, the Authority concludes that the factors identified by GAWB are all relevant (and should also take into account distribution losses). However, on a number of issues, the Authority has arrived at different conclusions:*

- *GAWB has proposed the same triggers for supply augmentation as for the imposition of supply restrictions. Given the difference between the costs of augmentation and of supply restrictions, different triggers that impose supply restrictions before initiating supply augmentation seem appropriate;*
- *GAWB’s proposed inflow assumption implies that the three-year worst consecutive average inflows will continue for five years or more. According to the Authority’s modelling, the probability of this materialising is less than one in 2000. Other assumptions could achieve GAWB’s stated objectives. For example, adopting an assumption that has one chance in 200 of materialising would allow construction to be deferred until absolutely necessary and allow more time for rain to occur. Should inflows turn out to be lower than this assumed level, sufficient time would still be available to trigger augmentation and defer dam failure by at least two years;*
- *Ultimately, determination of the appropriate inflow assumption is a matter for customers and other stakeholders. Furthermore, as demand estimates and inflow experience will change over time, GAWB and its customers should periodically review inflow assumptions; and*
- *GAWB’s proposed approach in regard to storage losses (evaporation and seepage losses) is appropriate and consistent with industry benchmarks for similar storages, but distribution system losses should also be recognised in the drought response trigger.*

*The Authority also concludes that the DMP should be amended to reflect the Authority’s other conclusions.*

## 2.1 GAWB's Proposed Criterion

GAWB has proposed the following criterion for triggering augmentation in response to drought:

*'to enable the appropriate augmentation to commence operations in sufficient time to avoid emergency restrictions and defer supply failure for a target period (currently two years), after allowing for inflows, losses, current and contracted future demand, and other forecasts as set out in the Drought Management Plan (DMP).'*

GAWB's criterion can be viewed in three parts.

The first part of the criterion refers to the construction of the appropriate augmentation which GAWB has previously nominated to be the construction of a pipeline to the Fitzroy River. As noted by the Authority in its Part (a) Final Report, there are many other possible responses to the drought. GAWB, while seeking to ensure that necessary preparatory works and investigations have been undertaken to allow a preferred contingent supply strategy to be put in place if required, has also recognised that other possibilities exist and has proposed a process for identifying, and putting in place, the most appropriate response. This process is detailed and reviewed in chapter 4.

The second part of the criterion defines the standard to be achieved (objectives or 'target outcomes') - that is, the avoidance of emergency restrictions and deferral of supply failure for a target period (currently two years).

The third part of the criterion can be regarded as the assumptions which underpin the estimation of the target period for the deferral of supply failure.

## 2.2 The Objectives

### *GAWB's Submission*

The key objectives underpinning GAWB's criterion are the avoidance of emergency restrictions and the deferral of supply failure for a target period (currently two years).

It should be noted that, under the DMP, a low supply alert is issued five years before projected dam failure. A mandatory 10% applies after 12 months. Emergency restrictions apply in the last six months before projected supply failure and involve 50% restrictions for municipal customers, and a total water ban for all other customers (including industry).

GAWB notes that, during this time, customers may trade their allocations (at their own negotiated prices) and GAWB proposes to incorporate curtailment arrangements in contracts to temporarily reduce demand during drought. These arrangements would be specified in contracts in advance and triggered during drought, to either supplement or replace restrictions. The arrangements provide customers with greater discretion about their levels of service. GAWB advised it has written to individual customers to determine their interest in negotiating an individual restriction regime tailoring levels of service.

### *Other Jurisdictions*

In many jurisdictions where drought has been an issue, the key stated objectives have been to avoid supply failure, and to avoid severe restrictions (defined in different ways). For example:

- the 2006 Metropolitan Water Plan for Sydney (NSW Government, 2006) stated its goal as the avoidance of severe supply restrictions. It proposed that, once extreme drought

conditions emerge and storages fall to 30%, construction of a desalination plant would be triggered. The NSW Government indicated that such restrictions impose significant social and economic costs for end users;

- in Western Australia, the Economic Regulatory Authority (ERA 2007) has investigated the Water Corporation's proposed service standard based on ensuring that the probability of a total sprinkler ban would be below 0.5% (1 in 200 years). The ERA (2007) confirmed its previous advice to Government that imposing such a standard may impose too high a cost on water customers and indicated a preference for a 1 in 50 target; and
- in the ACT, ACTEW (2004) indicated that it considered that customers would expect that a complete ban on outdoor use should not be planned for.

In Queensland, the Draft SEQ Water Supply Strategy (QWC, 2008) established level of service (LOS) objectives relating to the duration, severity and frequency of water restrictions. The QWC noted that the social and economic consequences of an unreliable water supply or failure of supply are simply unacceptable and that severe restrictions would not be implemented. The Strategy also incorporates a Drought Response Plan to ensure continuity of supply regardless of climatic conditions. Under this Plan:

- the T1 trigger level introduces medium level restrictions (15%) when there is nominally 36 months of water remaining in the drought storage reserve, taking into account climate resilient supplies such as desalination, recycled water and a minimum level of inflows equivalent to the second worst inflow year; and
- the T2 trigger level commences the construction of pre-planned drought infrastructure when 30 months of supply remains. The supply restrictions would remain at medium level (15%).

#### *Stakeholder Submissions*

Customers' comments focussed upon the possibility that different customers had the potential to respond to drought differentially.

For example, Callide Power Management (CPM):

- submitted that, through its DMP, GAWB has only partially sought to define customer levels of service, and has not acknowledged that different customer(s) may require different levels of service; and
- argued that GAWB has dismissed representations from CPM and other customers for a differentiated level of service. CPM stated that this was illustrated by GAWB's intention to share the costs of any augmentation/contingency response across the entire customer base.

CPM suggested that a differentiated level of service could be achieved by allowing customers to 'opt in' to a 'premium' reliability supply contract, where reliability is supplemented by any contingency response/augmentation. Other customers could elect to remain on a 'standard' reliability contract, receiving supply from Awoonga only, with a consequent higher exposure to drought risk and future supply restrictions.

RTA strongly supported the avoidance of emergency restrictions. RTA submitted that, without uninterrupted access to reliable water supplies, the ability to meet its customer requirements is compromised. RTA advised that this would be an unacceptable position for it

and its customers. RTA considered that the recent drought conditions and low supply alert demonstrated that GAWB is unable to provide the certainty of supply required.

RTA also submitted that the rationale for the nominated two-year extension to supply is not clear and that customers may still be under supply restrictions even following augmentation. RTA was concerned about the adequacy of the target period of supply particularly when set against possible increases in demand and the higher cost of incremental supply.

RTA submitted that, if a customer participated in a curtailment initiative to prevent or delay an augmentation, it should not be penalised for reducing consumption below its reservation levels.

### *The Authority's Analysis*

The criteria for triggering an augmentation in a drought should be consistent with the:

- GAWB's corporate objectives and goals; and
- criteria for augmentation more generally (that is, under normal circumstances).

GAWB's key business objectives and goals are to meet the water requirements of current and future customers, to achieve commercial results, be regarded as a responsible corporate citizen, and ensure the organisation has the ability to carry out its mission (GAWB, 2007:16).

Criteria for water supply augmentation in normal circumstances generally include consideration of the following factors:

- level of service to be delivered (for example, water quality, probability of failure, risk levels and downtime). The Authority (GAWB, 2002) noted that certain customers may be prepared to pay for more assets to ensure that particular service standards are met;
- forecast demand including contractual demand (QCA, 2005:84);
- availability of water supply, taking account of identifiable and predictable hydrological revisions (QCA, 2005:80);
- least cost options of infrastructure to access supplies. The Authority's approach seeks to ensure that the least cost is incurred to provide the requisite level of service over the relevant period (QCA, 2005:95); and
- public interest matters such as resource allocation, protection of consumers, social and equity considerations, availability of goods and services, environmental impacts and economic development (QCA, 2005:168).

### *Avoidance of Emergency Restrictions*

GAWB's criterion of avoidance of emergency restrictions and deferral of dam failure represents a worst case scenario and relates to a judgement concerning acceptable levels of service objectives.

In support of its proposal, GAWB has submitted that a number of GAWB's customers have limited ability to reduce demand. GAWB reiterated previous advice from Queensland Alumina Limited (QAL) that water is fundamental to QAL's production process, so that a 5% reduction in supply results in a 5% reduction in alumina output.

In this regard, the Authority notes previous submissions by stakeholders to GAWB's Drought Management Plan (DMP) and the current investigation that indicate that some customers (QAL, RTA) must have 100% reliability of supply and thus must avoid the total ban on the availability of water to industrial users associated with emergency restrictions. RTA's concern that GAWB's strategy may not extend the dam failure date sufficiently is particularly relevant in this regard. The economic cost of supply cessation for alumina processing facilities is likely to be significant relative to the cost of an augmentation strategy.

The Authority accepts that the economic costs of applying the emergency restrictions to some customers are unacceptable to those customers. It is also likely that, because of their potential broader implications for the regional economy, they are also unlikely to be acceptable to the Gladstone community.

Nevertheless, the Authority also notes:

- Callide Power Management's (CPM's) submission that customers should be provided with a choice as to how to respond in different circumstances; and
- that other customers (the formerly two councils and the power stations) may be prepared to consider more extensive water restriction regimes to avoid the costs of augmentation.

In the absence of submissions from the councils, it is difficult to determine whether residential customers can tolerate the current emergency restrictions. However, in submissions to the Part (a) investigations, the then Calliope Shire Council indicated that it supported the 50% emergency restrictions applied to residential customers. It is also noted that domestic consumers in SEQ have reduced consumption from pre-drought levels of nearly 300 litres per person per day to less than 140 litres per person per day in response to recent drought conditions (QWC, 2008).

The Authority considers that customers should be in the best position to judge their own expected costs from drought and their tolerance of supply risks. The Authority notes that these can differ substantially between GAWB's customers. However, customers will require relevant information regarding pricing impacts of various response options as an input to their own decisions. Unless this information is readily available, more crude responses such as supply restrictions may be required.

The QWC has noted that stakeholder preferences (in SEQ) are not always well aligned and has applied a single level of service objective across the region. The Authority considers that, in GAWB's circumstances, as a bulk supplier to a small number of customers, there is scope to implement different levels of service.

Unlike in many instances where the transaction costs of bilateral negotiations could be too high, GAWB is uniquely placed to service a small number of customers all on a contractual basis. The Authority observes that such an approach, as it is tailored to individual customers needs, should enhance Gladstone's attractiveness for industrial development.

In its proposals, GAWB has accepted that different levels of service quality should be provided and has indicated that it is relying on the prospect of commercial trading and the proposed curtailment arrangements to facilitate these different service standards.

In its Part (a) investigation, GAWB indicated, and the Authority accepted, that trading opportunities may be limited due to the small number of customers and the particular circumstances of Gladstone's physical market. Nonetheless, the Authority accepts that the

availability of a commercial framework for trading provides an option for some customers to address differential service standards under drought conditions.

The Authority also concluded that GAWB's proposed curtailment policy has merit as it recognises the differential capability of parties to reduce water consumption (QCA, 2007:30). The Authority continues to support this option, to enable unused contracted reservation volumes to be utilised to defer unnecessary further restrictions or augmentations. The pricing implications of curtailment should be negotiated as part of contractual arrangements, but the Authority notes that, unless charges on the reservation volume are adjusted, there may not be sufficient incentive to adopt a curtailment strategy.

The relevance of these options to a particular set of circumstances needs to be considered within the context of the process proposed by GAWB and addressed in chapter 4.

While the Authority has received submissions from customers indicating a willingness to consider alternative levels of service quality and more extensive water restrictions, the Authority has not received any indication that any industrial customer could tolerate the zero supply envisaged under the emergency restrictions for other than, perhaps, a very short period of time. The objective of avoidance of emergency restrictions should, if achieved, result in appropriate responses (augmentation or otherwise) to ensure continuity of supply.

Even if some industrial customers could tolerate the zero supply situation associated with the emergency restrictions, avoidance of the restrictions is necessary to address the needs of those customers who cannot operate under such severe restrictions. Not all will have the ability to consider alternative sources of supply (such as for example, a stand-alone desalination plant).

Quite clearly, however, the nature of the response to drought will be affected by the volume of water required by those customers who could not access alternative sources and require water to continue to operate.

In this regard, the Authority's investigation into the appropriateness of GAWB's preferred augmentation strategy relating to the Fitzroy Pipeline is particularly relevant. In its Part (a) Final Report into this matter, the Authority concluded that there were a wide range of plausible options that need to be considered. The more evident options were outlined in that Final Report. Most of these options are still considered relevant and more may be identified by GAWB and its customers over time.

As noted further below, there is sufficient time available under the envisaged key assumptions, particularly those relating to inflows, for the most appropriation options to be considered and defined within the context of the consultation process proposed by GAWB and reviewed in chapter 4.

Accordingly, the Authority accepts that avoidance of emergency restrictions is a relevant objective for triggering construction if, after considering all options, augmentation is the appropriate response. The pricing implications of the various options are likely to be a key input to the choice of response.

#### Deferral of Dam Failure

GAWB has currently proposed that dam failure should be extended by a target period (currently at least two years).

The Authority accepts that any response, including augmentation, should seek to defer dam failure. However, GAWB has not substantiated the basis of the two-year target period currently set.



The Authority notes that deferral of dam failure by two years would allow an additional two years in which further inflows could be secured and which, if sufficient inflow was received over that time, could avoid the need for further augmentations.

Further, as part of the Authority's Part (a) investigation, the Authority accepted GAWB's conclusions from its experience with a previous drought that restrictions were applied too late.

Nevertheless, in establishing the appropriate time to defer dam failure, factors such as the probability of continuing low inflows and the scale and cost of the particular augmentation option adopted are relevant.

For example, a larger (60GL) pipeline or desalination option to the currently preferred 30GL Fitzroy Pipeline could delay the need to commence construction until two years prior to failure as it can fully meet annual demand once constructed. Until demand increased, dam failure could be deferred indefinitely under such an option. By comparison, under GAWB's proposal, the 30GL pipeline option would need to be in place earlier to ensure that a two-year extension of dam failure is achieved as it can only deliver half the current annual demand for water in any year.

The Authority notes also that any deferral by more than is necessary foregoes the opportunity of rain which could defer the need for expensive infrastructure augmentation.

While the objective of deferral of dam failure is considered appropriate, many factors will be relevant to determining the decision lead time necessary to avoid dam failure. These factors include the nature of option being considered, for example the pipeline size. Such issues need to be considered in the context of the planning process proposed by GAWB (chapter 4 refers).

## 2.3 Assumptions

GAWB's criterion refers to various assumptions which underpin the timing of an augmentation in response to drought. These include inflows, losses, current and contracted future demand, and other forecasts set out in the DMP.

### *Inflows*

#### GAWB's Submission

GAWB submitted that the assumed level of Awoonga Dam inflows is a key factor in GAWB's criterion for triggering construction in response to drought. GAWB referred to a report prepared by Synergies Economic Consulting (Synergies) which reviewed the inflow options.

The key variable in the inflow assumption is the period over which the historical worst sequence of inflows should be averaged.

Synergies noted that GAWB's previous, to the current DMP, inflow assumption was the average of the 10 worst consecutive years of inflow on record (from 1993 to 2002). Synergies indicated that this approach was based on advice from Hydro Tasmania Consulting that a 10-year period constituted an appropriate period for averaging inflows.

However, Synergies stated that there was a strong argument to reduce the time period for averaging inflows, given that the 10-year average includes one substantial inflow (1996) while the average of the remaining years is much lower. Synergies concluded there was significant scope for inflow sequences to occur over three to five years which would be well below the 10-year worst average.

This proposition was also supported by Connell Wagner, in its review of GAWB's drought model (AWSIM-D).

Synergies identifies two alternative scenarios, based on:

- assuming zero inflows during the period going forward. Synergies indicated this would trigger DMP actions while storage levels remain relatively high. Synergies considered this could result in unnecessarily early restrictions; and
- setting the trigger not on the basis of assumed inflows, but simply when Awoonga Dam has three years of supply left at current demand (regardless of inflows, and after allowing for evaporation and seepage). Synergies indicated this would be at a storage level of 28.2m, equivalent to 225,060ML based on current demands.

Synergies noted that, in selecting a time period for averaging inflows:

- flow assumptions should draw from historical events, but be sufficiently conservative that there is a low probability of a lower flow occurring [Synergies did not quantify what it considered to be a low probability];
- it is desirable but not essential to avoid triggering a Low Supply Alert or supply restrictions above a dam level of elevation level (EL) 30m as it would be inappropriate to have restrictions while environmental releases continue to be made. Environmental releases are discontinued once dam levels fall below EL 30m; and
- at the trigger point for a Low Supply Alert, it is desirable to have at least three years forward supply in reserve in storage to enable a supply response to an extreme series of years (for example, zero inflows).

Synergies stated that inflow assumptions should:

- focus on conservative options, given the step down change in rainfall in the region since the 1970s. Synergies indicated that there is limited historical data available to GAWB and that worse inflow sequences could occur in future;
- attempt to achieve a balance between:
  - the risk of not applying restrictions early enough; and
  - the risk of requiring supply alerts and restrictions on a too frequent basis, which can result from overly conservative inflow assumptions which do not reflect actual inflows;
- include an assessment of the likelihood of various inflow assumptions using stochastic modelling and historical data; and
- ensure that the risk of over-estimation is managed accordingly.

Synergies' analysis compared estimated inflows based on the worst 10 year (consecutive) average inflows, the average worst consecutive four years and the average worst consecutive three years. For each of these scenarios, and a worst case zero inflow assumption, Synergies identified the dam level for triggering a Low Supply Alert and the time to dam failure, based on dam levels as they existed at December 2007. Table 2.1 refers.

**Table 2.1 Summary of Options (GAWB/Synergies)**

<i>Time Period for Averaging Inflows (Consecutive Years)</i>	<i>Worst Average Annual Inflows (ML) May to April</i>	<i>Low Supply Alert Trigger (dam level, EL metres)</i>	<i>Time to Failure (months from May 2007)</i>
Lowest 10 years	69,243	23.6	150
Lowest 4 years	46,432	26.6	80
Lowest 3 years	23,633	30.4	60
Zero inflows	0	34.2	48

*Note: Synergies examined the worst historical sequences (consecutive years) as well as the averages of the worst non-consecutive years. Only the consecutive sequences are noted here.*

Synergies recommended that the time period for averaging the worst inflows should be three consecutive years on the basis that:

- it is relevant in terms of the current drought sequence, given the potential for a step change in inflows over recent years;
- is prudently conservative, as:
  - it is assumed that the worst three-year sequence on record will continue for a period of five years<sup>1</sup>, thus assuming that the five-year worst average will in future be lower than now; and
  - stochastic modelling indicated a very low probability of lower inflows occurring. For example, Synergies estimated that the probability of an average consecutive inflow over three years of less than 19,000ML per year was only 1%<sup>2</sup>; and
- it triggers a Low Supply Alert at a dam level of EL 30.4m (296,000ML), with sufficient storage to support current demands for more than 36 months if the worst case (nil) inflows occurs over five years, and therefore provides a window for GAWB to augment supply to avoid storage failure in such an extreme event.

Synergies also indicated that it may be a prudent measure to limit the time period for averaging consecutive inflows to, at most, the five-year forecast period used for the DMP.

The data indicated that the lowest three-year sequence in the three years leading up to 2007 is May 2004 to April 2007, with an annual average inflow of 23,633ML.

GAWB further justified this approach as being supported by:

- industry practice – augmentations under way in SEQ and Melbourne are based on drought inflows that are equivalent or more conservative than that adopted by GAWB; and
- prudent risk management – the approach allows GAWB to adapt its response should more severe events emerge.

<sup>1</sup> According to Synergies, the period of 5 years comprises the 5-year life of the DMP.

<sup>2</sup> As discussed later, Cardno estimates that the 1% probability for inflows over 3 consecutive years is 29,750ML and not 19,000ML

### Other Jurisdictions

In Western Australia, the ERA (2007) has investigated the Water Corporation's assumptions in regard to triggering capital expenditure on a pipeline to the metropolitan area from South West Yarragadee. The ERA considered that the Water Corporation's assumptions, based on a six-year average worst consecutive inflow as against the previously used 10-year average, were overly conservative. However, the capital expenditure was considered reasonable in the face of climatic uncertainty.

In the South East Queensland Water Strategy, the Queensland Water Commission has proposed that, as part of the proposed Drought Response Plan, an augmentation would be triggered at dam levels when sufficient water is available in the drought storage reserve, including climate resilient supplies to meet restricted demand for a period of 30 months. Climate resilient supplies include desalination, purified recycled water, and inflows to dams and weirs equivalent to the second worst year on record, adjusted for evaporation and transport losses. The QWC did not provide reasons for its inflow assumption.

Historically, the Victorian Government (DSE, 2007) used the average inflows from the past 100 years and the worst consecutive 10 years to guide their water supply planning for Melbourne. However, in response to climate change and rainfall uncertainty, the Victorian Government developed a new scenario that envisages a repeat of the past three years' inflows. The Victorian Government claimed that this approach was risk averse and prudent as a basis for water supply planning for Melbourne.

The NSW Government's Metropolitan Water Plan did not identify an assumed level of inflows for triggering a drought response. Rather, the trigger was related to a pre-determined dam level of 30%. However, the Plan recognised the impact of recent inflow data on annual water availability which was reduced by 30GL.

### Stakeholder Submissions

CPM submitted that the very low inflow assumption proposed by GAWB constrains the time available to identify, evaluate and develop supply augmentation or demand management options.

CPM noted that this constrains the 'field of supply augmentation or demand management options which are able to materially affect the projected time to dam failure (once a Low Supply Alert has been triggered), hence biasing the choice of contingent response towards larger (supply only) options'.

CPM further considered that the DMP fails to allow for any consideration of whether, for a particular low supply situation, there is a different probability around future inflows, and hence a different cost/benefit trade-off for committing early to a contingency response. CPM stated that 'it effectively links a decision to incur significant contingency costs, with 100% certainty, to an inflow assumption which has proved in fact to be less than 100% certain'.

CS Energy's view was that GAWB has chosen an unrealistically conservative measure for expected inflows which gives an unduly pessimistic result. CS Energy considered that the Synergies' report for GAWB underplayed the importance of the occurrence of high inflow events. CS Energy considered that, while the frequency and extent of the big inflows have reduced in recent years, they are still extensive and frequent enough to warrant a more optimistic view than the 23,000ML per year being assumed by GAWB.

RTA acknowledged that the assumption of the average worst consecutive three years of inflows is a conservative estimate. Nonetheless, RTA accepted the prudence of this

assumption provided that any cancellation costs for augmentation that is commenced but is no longer warranted are managed efficiently.

RTA indicated that there was only three months between the imposition of supply restrictions and commencement of augmentation in response to drought, giving little time for customers to present demand (or supply) side alternatives.

#### The Authority's Analysis

The Authority accepts that the inflow assumption for triggering supply augmentation is an essential variable within the criterion for triggering the commencement of construction necessary to avoid the imposition of emergency restrictions, as it is necessary to establish the expected date of dam failure.

Without any response, dam failure occurs in five years when assuming the average worst three consecutive year inflows.

In general, the higher the assumed average inflow, the later restrictions are triggered. The earlier restrictions are triggered and the more stringent they are, in general, the later augmentation will be required. The smaller the augmentation, the earlier construction needs to be commenced to meet the objective of at least a two-year deferral of dam failure. A larger augmentation may be deferred to closer to the time of expected dam failure although the size of the augmentation could affect the construction timetable and would also need to be taken into account.

Under the current DMP, the construction commences at the time the 10% water restrictions are imposed (four years before dam failure). Construction of the preferred contingent supply strategy (being the Fitzroy Pipeline) which is expected to take two years, and which supplements supply from Awoonga Dam, leaves two years of full operation and defers dam failure by 36 months (on the basis of GAWB's assumptions and modelling). This exceeds GAWB's stated objective of deferring dam failure by two years.

As part of the Authority's Part (a) investigation, the Authority accepted that the use of the average worst consecutive three-year inflow was prudent for the purpose of triggering the DMP as this would lead to earlier imposition of phased restrictions (QCA, 2007:20). That is, alternative higher inflow assumptions would delay triggering restrictions and construction and, if the inflows realised were more akin to the average worst consecutive three-year inflows or worse (zero inflows for even one or two seasons), then it may not be possible for the 30,000ML option to be constructed and meet current levels of demand (and achieve GAWB's desired minimum two year deferral).

However, as noted above, under the current DMP and the preferred contingent supply strategy, the construction of the 30,000ML Fitzroy pipeline could have been delayed by at least one year and still meet GAWB's preferred two-year deferral of dam failure (on GAWB's assumptions). Factors other than the quantum of inflows are relevant to when the commencement of augmentation should be triggered.

Those factors previously noted include the level of demand to which customers are prepared to reduce consumption (either during the phased restrictions period before the imposition of emergency restrictions or for the purpose of emergency restrictions). Other factors include the risk that customers are prepared to carry relating to delays in commencing construction, increased prospect of rain in the case of deferral and the costs involved.

Those costs are significant. As part of its Part (a) investigation, the Authority has observed that supply augmentations are usually more costly than supply restrictions, particularly

restrictions imposed on urban consumption. Further, while supply restrictions can be removed at no cost, the same is not the case for supply augmentations. New supply still has to be paid for even if it is no longer needed (QCA, 2007:20).

The relevance of the above matters is that customers' preparedness to enter into curtailment arrangements and to contract to pay the costs of prospective augmentations are affected by customers' perceptions of the risks associated with deferral of augmentation and the price implications of various response strategies. These in turn depend upon the probabilities associated with projected inflows. These perceptions may differ over time and in different circumstances.

Customers' preferences in turn will affect GAWB's decisions related to its supply management responsibilities.

The Authority's current understanding of the factors relevant to the choice of inflow assumption is as follows.

(a) Historical Background

For comparison, the historical worst inflow sequences, based on the available data, are detailed in Table 2.2 below.

**Table 2.2 Historical Worst Inflow Averages (Consecutive Years)**

<i>Time period for averaging inflows (years)</i>	3	4	5	6	7	8	9	10
<i>Period</i>	2004-2006	1998-2001	1997-2001	1996-2001	1994-2000	1994-2001	1993-2001	1992-2001
Average Annual Inflow (ML)	24,161	46,432	42,994	52,055	80,722	73,660	74,151	71,739

*Note: In its revised DMP, GAWB indicated its 'worst three year' inflow assumption is based on a May to April water year. The above average sequences therefore reflect a May to April water year. Further, the Authority had previously used GAWB's stated worst average three-year inflow of 23,633 ML, as stated in its DMP. The worst average consecutive three-year inflow of 24,161ML per year, as stated above, now reflects actual recorded inflows for 2007.*

Worst consecutive inflow averages taken over seven to 10 years fall into a similar range of around 70,000ML to 80,000ML and typically incorporate a major inflow event. The averages over four to six years generally fall into the 40,000ML to 60,000ML range, while the three-year average is much lower at 24,161ML per year. It is noted that the average worst consecutive five-year average is less than the worst four-year average, as both only include one significant inflow event.

As stated by GAWB, the previous DMP used the worst average 10-year inflow sequence, which is considerably longer than the five year period managed by the DMP.

The Authority notes that the historical worst 10-year inflow sequence occurred between 1993 and 2002 and included a significant inflow (258,000ML) in 1996. Excluding this inflow, the average for the remaining nine years of the sequence is 52,301ML per year. A major inflow event may not be expected to recur within the five-year period after the DMP is triggered. A time period for averaging inflows which includes a major inflow event would not provide a prudently conservative approach for deriving a drought response trigger, given how infrequently major inflows occur.

In principle, the inflow assumption should not include significant inflow events.

The Authority notes that the scope of Synergies’ review of the DMP inflow assumption was limited to trigger points for the low supply alert and water supply restrictions and did not specifically address supply augmentation.

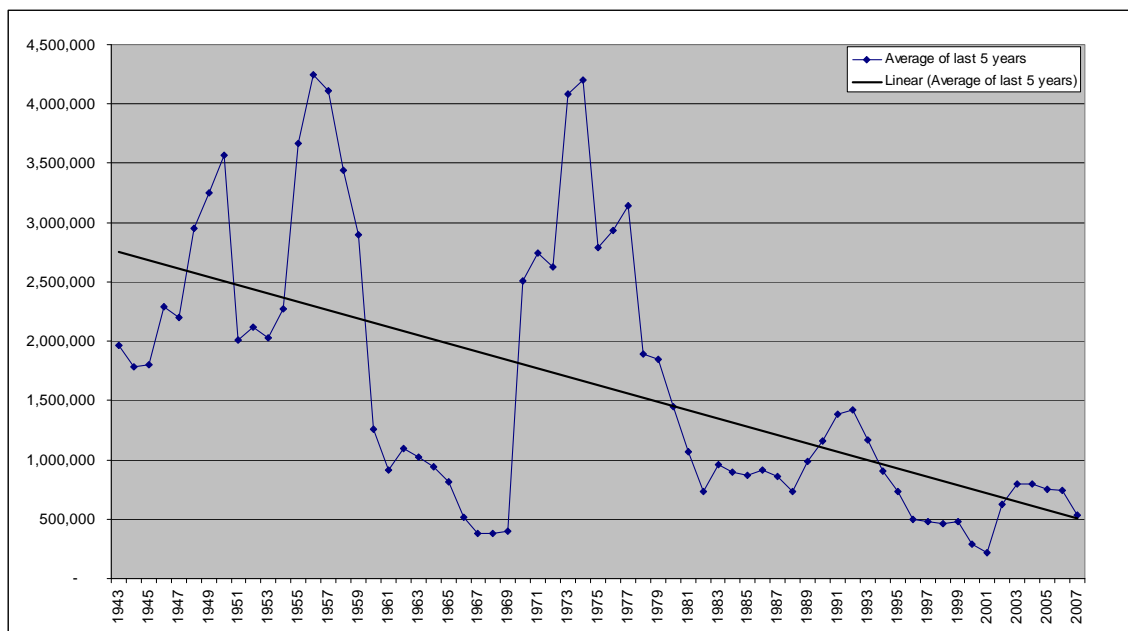
(b) Climate Change

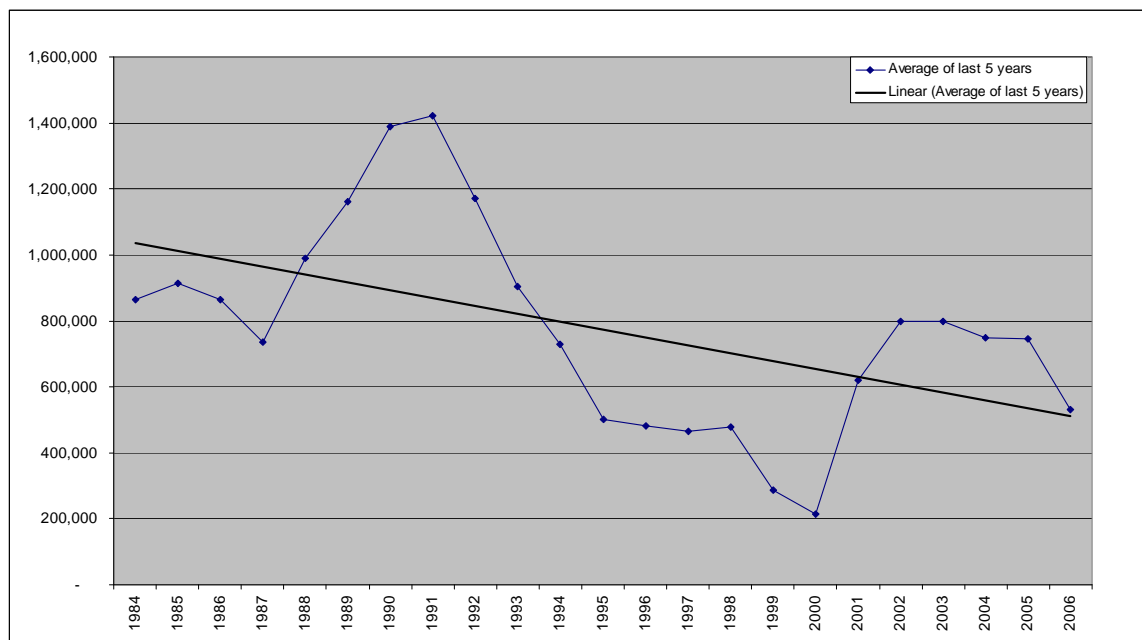
With respect to climate change, the Authority notes that variations in average annual rainfall in the order of -15% to +7% over much of Queensland are expected by 2030 (BOM 2007, CSIRO 2005), and that the most likely change in mean annual inflows for the Fitzroy River due to climate change would be -15% to +5% by 2030 (CSIRO 2005). No specific information is available in relation to the Boyne River catchment.

To analyse recent rainfall trends, the Authority reviewed historical trends using available inflow data. The trend lines for the five-year historical moving averages were downward sloping for the available data since 1938, reflecting the move from the wetter years in the 1940s and 1950s, leading into the subsequent drier years. For the subset of data since 1980, a downward trend remains (Figures 2.1 and 2.2).

The Authority found that, projecting forward based on these linear trends, average annual inflows could decline to the 60,000 to 80,000ML range over the next five years. However, as trend-based forecasts reflect overall averages, rather than the average inflows during the dry periods, they are not considered to be conservative enough for establishing drought triggers.

**Figure 2.1. Awoonga Dam Inflows – 1938-2007, five-year moving average**



**Figure 2.2. Awoonga Dam Inflows 1980 – 2007, five-year moving average**

The Authority notes Synergies' concerns about climate change impacts on future inflows given the limited history currently available to GAWB. In addition, it is noted that the QWC has adopted a climate change scenario for SEQ based on a mid-range estimate of a 10% reduction in available yield from current storages as compared to already reduced levels. The Authority therefore concludes that it is prudent to account for the risk of long term variations in rainfall patterns which could be due in part or in whole to climate change in determining the time period for averaging the worst inflow sequences. In general, this analysis strengthens the case for a shorter more conservative time period for averaging inflows.

#### (c) Probabilities

CPM expressed concern that GAWB's inflow assumption was not based on a sufficient probability weighted assessment of the risks and corresponding costs. In a submission in response to stakeholder comments, GAWB agreed that a probabilistic approach to inflows may be a factor in future for determining the appropriate augmentation options.

The Authority engaged Cardno to review Synergies' stochastic modelling, provide advice on the probability of inflows over the period of the DMP and recommend appropriate inflow assumptions, in particular, for a drought supply augmentation.

Cardno indicated that drought modelling based on averaged annual worst inflow (as used by GAWB) is adequate. However, Cardno considered that using a worst average inflow sequence greater than five years is considered to be inappropriate due to the variability of the annual inflow.

Cardno supported the use of stochastic modelling as prudent when historical data is limited, as is the case with meteorological data, and when risks are high and consequences severe. Stochastic modelling is a way of creating more data with the same statistical properties to overcome the constraint of limited historical data in considering the duration and variability of droughts with more severe consequences.



Cardno reviewed GAWB's stochastic modelling and regenerated data using a program called Syngen2h from the Department of Natural Resources and Water (DNRW). The program uses a logarithmic transformation and provides a range of distribution options of which the Log-Pearson III option was selected.

While GAWB used historical data from 1984 to 2006 in its modelling, Cardno chose data from 1939 to 2008 arguing truncation of downward trending data was not as beneficial as the greater reliability of the statistical properties of the larger data set. However, Cardno excluded data for the period from October 1964 to August 1966, as zero flow data for much of this period was considered inconsistent with rainfall data.

Cardno's modelling indicated that there was a 0.5% probability (i.e. once in every 200 years) that average consecutive inflows would be less than GAWB's assumed inflows of 23,633ML/year over a three-year period. The probability that average inflows would be less than 23,633ML per year over five years was only 0.05%, or once in every 2000 years. Cardno considered that this assumption was a very conservative assumption even with regard to accounting for climate variability. Cardno's stochastic modelling evaluated the probability of various inflows occurring over different durations, as detailed in Table 2.3.

**Table 2.3: Results of Stochastic Modelling**

	5%	2%	1%	0.5%	0.1%	.05%
	(once in 20 years)	(once in 50 years)	(once in 100 years)	(once in 200 years)	(once in 1000 years)	(once in 2000 years)
3 Years	55,176	38,189	29,750	23,683	14,667	12,216
4 Years	69,454	50,210	39,896	33,746	21,404	16,538
5 Years	82,654	60,209	49,470	40,310	28,304	23,688

*Note: This table indicates, for example, that there is a 1% probability that the average of the worst consecutive inflows over a four-year period would be less than 39,896 ML per year.*

In terms of a trigger for augmentation, Cardno considered the impact of the increased costs resulting from an augmentation and concluded that a less conservative inflow assumption should be used. Cardno considered that, if the trigger for an augmentation was not required to coincide with a trigger for supply restrictions, the worst consecutive average five-year inflows or the one in 100 year worst consecutive five-year inflows (whichever is the lower) would be more suitable than the worst three-year assumption proposed by GAWB, particularly as is the inflows are assumed by GAWB to apply for five years. The actual worst consecutive five-year inflow is 42,994ML per year and is lower than the one in 100 year worst consecutive five-year inflows of 49,470ML per year.

However, Cardno also indicated that stochastic data are sensitive to prolonged years of low flow such as that occurring during drought. To account for further possible climate variability, Cardno advised that it would be advisable to err on the conservative side and proposed either the average worst consecutive inflow for a period less than four years (e.g. 3 years), or the one in 100 year flow (of stochastic data) for the worst consecutive four-years inflow. Cardno noted that the former is more conservative than the latter and does not require regular generation of new stochastic data.

In the absence of any further conceptual basis for discerning which of the scenarios was most appropriate, the Authority analysed the impact of alternative scenarios, based on the dam level as at 30 April 2008 (432,193ML) including:

- the three-year average worst consecutive inflows proposed by GAWB (24,161ML per year);
- the one in 200 year (0.5 percentile) four-year average worst consecutive inflows identified by Cardno (33,746ML per year);
- the one in 100 year (1 percentile) four-year average worst consecutive inflows as suggested by Cardno (39,896ML per year); and
- the five-year worst average worst consecutive inflows initially suggested by Cardno (42,994ML per year).

The Authority used GAWB's hydrology model, adjusted to ensure that the modelling only incorporated environmental releases as approved over the EL 30m dam level, to assess alternative inflow assumptions. For the purposes of the analysis, the inflow assumptions are assumed to prevail over the whole of the modelling period. This means, in effect, that in GAWB's proposed assumption, inflows would be limited to 24,161ML per year for the five-year period of the DMP, plus the two years targeted for deferral of dam failure. Clearly, the probability of inflows based on the worst three years continuing for five years or more would be very low.

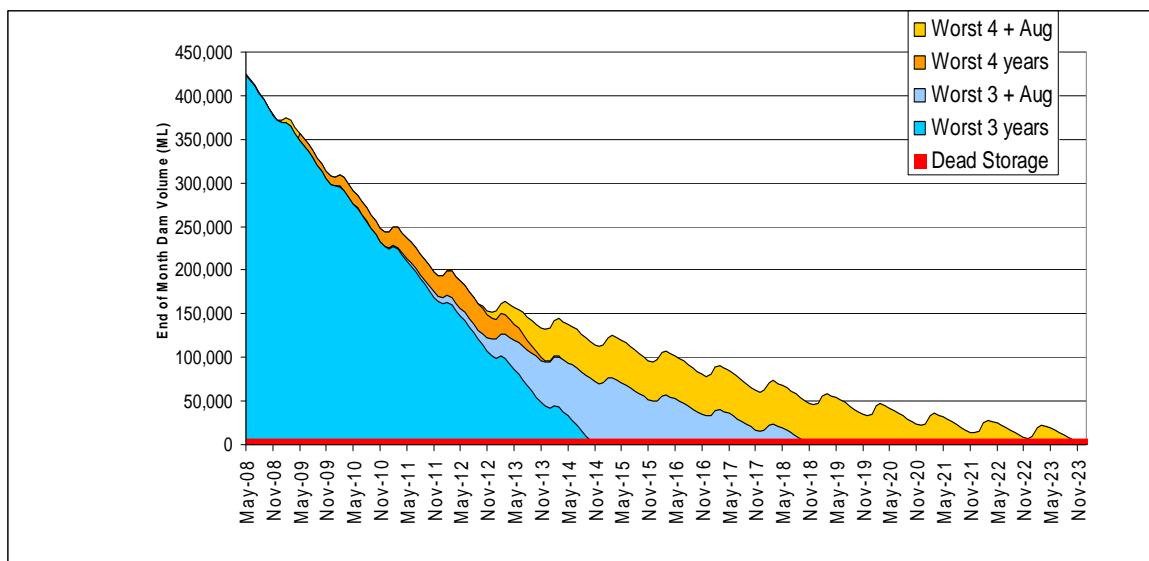
The implications for the date of dam failure of the alternative inflow assumptions have been estimated without augmentation or restrictions (Column 1) and with augmentation and restrictions (Column 3) - see Table 2.4 below. Also estimated is the trigger date for construction of the augmentation (Column 2). For the purposes of this analysis, the augmentation is the Fitzroy 30,000ML pipeline, and demand growth is as identified in the Part (a) investigation (that is, limited to the demand of existing customers at the time the low supply alert is triggered).

**Table 2.4: Implications of Alternative Inflow Assumptions**

<i>Inflow Assumption</i>	<i>Expected dam failure (no augmentation) (Column 1)</i>	<i>Trigger date for commencement of construction to facilitate at least 2 year deferral of dam failure (based on DMP) (Column 2)</i>	<i>Expected failure date with augmentation and 10% restrictions<sup>1</sup> (Column 3)</i>
Worst 3 years (actual) (24,161 ML)	October 2014	October 2010	October 2018
Worst 4 years (1 in 200 year chance inflows will be lower) (33,746 ML)	August 2016	August 2012	October 2021
Worst 4 years (1 in 100 year chance inflows will be lower) (39,896 ML)	August 2017	August 2013	>2030
Worst 5 years (actual) (42,994 ML)	September 2017	September 2013	>2030

1. It is assumed that supply restrictions are triggered assuming the worst consecutive three-year average inflows, 12 months after the low supply alert, for all cases.

**Figure 2.3. Lake Awoonga Storage Projections (three-year and four-year one in 200 year Worst Average Inflow Assumptions, with 10% restrictions under the DMP)<sup>1</sup>**



1. Note that this Figure does not incorporate all the scenarios presented in Table 2.4.above.

On the basis of GAWB’s proposed worst average consecutive three-year inflow, dam failure (without augmentation) would be expected to occur in October 2014, and the commencement of construction of the augmentation (and supply restrictions) would be triggered in October 2010 (one year after the low supply alert is triggered). If the Cardno recommendation for the five-year average worst consecutive inflow assumption is adopted in place of the three-year average worst inflow, the trigger date for construction would be delayed by almost three years, from October 2010 to September 2013. Similarly, adoption of the one in 200 years four-year worst consecutive inflows would delay the trigger date for construction by almost two years to August 2012.

Even using GAWB’s assumptions, the 30,000ML per year Fitzroy Pipeline results in a deferral of dam failure of more than the two years targeted by GAWB. This is because, under GAWB’s DMP, the trigger date is determined by the inflow assumption not the specified target of a two-year deferral.

After taking into account the size of the Fitzroy Pipeline, adjusting GAWB’s model to ensure that environmental flows are not incorporated when dam levels fall below EL 30m and limiting demand to the level of contracted demand at the time the low supply alert is triggered, a deferral of dam failure of 48 months occurs.

On this basis alone, the trigger date for construction could be delayed for almost a further two years and still achieve the targeted deferral of dam failure by two years.

The trigger dates for construction of the 30,000ML per year Fitzroy Pipeline, on the basis of the Authority’s modelling, but which result in a deferral of dam failure of exactly two years are as shown in Table 2.5 (assuming the 10% restrictions are applied).

On Cardno’s one in 200 year four-year average worst consecutive inflow assumption, the trigger date for commencement of construction would be delayed until February 2014.

**Table 2.5: Augmentation triggered to extend expected dam failure by 24 months**

<i>Inflow Assumption</i>	<i>Expected dam failure (no augmentation)</i>	<i>Trigger date for commencement of construction to facilitate exactly 2 year deferral of dam failure, allowing for supply restrictions<sup>1</sup></i>	<i>Expected failure date with augmentation (extra 30,000 ML) and 10% restrictions<sup>1</sup></i>
Worst 3 years (actual) (24,161 ML)	October 2014	September 2012	October 2016
Worst 4 years (1 in 200 year chance inflows will be lower) (33,746 ML)	August 2016	February 2014	October 2018
Worst 4 years (1 in 100 year chance inflows will be lower) (39,896 ML)	September 2017	April 2015	December 2020
Worst 5 years (actual) (42,994 ML)	September 2017	July 2015	>2030

*1 – It is assumed that supply restrictions are triggered assuming the worst three-year average consecutive inflows, 12 months after the low supply alert, for all cases.*

The Authority also considered a scenario where the assumed inflows for the augmentation trigger are based on Cardno's one in 200 year four-year worst consecutive inflow (33,746ML per year), but inflows that are actually recorded (that is, realised) in the year before the trigger date for augmentation are equivalent to the worst consecutive three-year average (24,161ML/year) and are then assumed to apply into the future.

Under this scenario, and assuming that the Fitzroy Pipeline represents the preferred augmentation option, an extension of dam failure by at least three years would still be possible, as the trigger date would be brought forward (about one year) earlier than the expected date of August 2012 under the one in 200 year four-year consecutive inflow assumption (see Table 2.4) once the lower than expected falls are identified by GAWB.

In summary, the Authority:

- notes that GAWB's inflow assumption implies that the three-year worst inflows will continue for five years or more. The Authority's modelling indicates that this has a less than a one in 2000 chance of occurring;
- based on a 30,000ML per year Fitzroy Pipeline option and the average worst consecutive three years:
  - even on GAWB's demand assumptions and modelling, the date for triggering the commencement of construction could be deferred by one year;
  - on the Authority's assumptions and modelling (which incorporate corrections to the modelling of environmental flows and demand which is consistent with the Authority's Part (a) investigation), the date of triggering the commencement of construction could be deferred by almost two years;
- based on the 30,000ML per year Fitzroy Pipeline and, for example, Cardno's one in 200 year four-year worst consecutive inflow, the date of triggering the commencement of construction could be deferred by almost four years.

The Authority considers that a number of alternative inflow assumptions could achieve GAWB's stated objectives and at the same time:

- allow construction to be deferred until absolutely necessary providing time for any further rainfall to occur; and

- with appropriate monitoring of inflows by GAWB, should inflows turn out to be lower than this assumed level, still allow sufficient time to trigger augmentation and defer dam failure by at least 2 years.

An example of such an alternative is Cardno's four-year worst consecutive inflows assumption which has a one in 200 chance of occurring.

A key feature of the Authority's proposed approach is that it differentiates between the trigger for commencement of augmentation and the trigger for restrictions under the DMP.

Notwithstanding the technical assessment outlined above, given appropriate information about the price of various supply/demand options and adequate time to consider the issues, customers are ultimately best placed to assess the implications of the risks involved. Therefore:

- the appropriate inflow assumption to apply is ultimately a matter for customers and other stakeholders; and
- as demand estimates and inflow assumptions will change over time, GAWB and its customers should from time to time review which assumptions are most appropriate from their collective perspectives. This issue is further discussed in chapter 4.

(d) Benchmarks in other Jurisdictions

GAWB has placed some emphasis on the conservative approaches for inflow assumptions used in water plans such as those for SEQ and Melbourne. The Draft SEQ Water Strategy adopted a particularly severe assumption that inflows would be limited to the second worst single-years' inflow as the basis for estimating climate resilient supplies.

The Authority accepts that conservative inflow assumptions are now the industry norm notwithstanding that the ERA adopted a six-year worst consecutive inflow average for Western Australia (WA).

### *Storage Losses*

#### GAWB's Submission

GAWB indicated that dam losses were an issue to be considered in the criteria. GAWB's DMP indicated that losses include environmental releases, evaporation and seepage that vary subject to the level of water stored in Awoonga Dam.

GAWB submitted that environmental releases are halted when water levels are below 30m (around 282,000ML).

GAWB uses a water balance model to assess the long term performance of Awoonga Dam. To estimate the evaporation loss from the surface of the lake, the model uses evaporation pan data from Biloela and Rockhampton and applies calibrated correction factors to convert the regional evaporation data into site specific Awoonga evaporation data. Although the Awoonga weather station has a pan, this has only been in operation for 4 years.

Average evaporation over the period from 1984 to 2007 was 125mm per month or approximately 1500mm per year. Seepage through and under the dam was estimated at 30mm per month, giving a total loss from the dam of 1860mm per year. GAWB indicated that losses would increase with increasing reservoir level.

#### Other Jurisdictions

The Draft SEQ Water Strategy (QWC, 2008) indicated that evaporation losses were allowed for in establishing the drought storage reserve. The QWC identified the reduction of evaporation from dams and weirs as an area for further research.

#### Stakeholder Submissions

No stakeholders commented on Awoonga Dam loss assumptions.

#### The Authority's Analysis

The Authority engaged Cardno to assess GAWB's assumptions about storage evaporation and seepage losses. Cardno noted that it is important to estimate evaporation and seepage loss reliably in the model as it accounts for a large portion of the outflow from the dam. Cardno concluded that the approach adopted by GAWB was in common with other water balance studies and was acceptable. The Authority therefore accepts GAWB's proposed approach.

GAWB indicated that only storage related losses were incorporated into the DMP and that distribution system losses may be considered in any future review.

The Authority concludes that distribution system losses should be recognised also, and for the purposes of a drought response trigger, may appropriately be incorporated in the total demand projection. The efficient level of distribution system losses is reviewed in chapter 3.

#### *Demand Assumptions*

##### GAWB's Submission

In regard to the current drought circumstances, GAWB has provided an updated demand scenario for its base case in an attachment to its submission prepared by Synergies. This indicated that the revised demand forecasts are less than previously assumed in GAWB's drought model used in developing the DMP. Synergies indicated that this was due to updated information being available and noted that the lower demand projections have the effect of reducing the likely impact of drought and extending the period to supply failure.

Synergies also noted that the current DMP required the forward water demand projection to be reviewed based on customer commitment to reservation volumes within 30 days of the triggering a low supply alert (five years from dam failure). Synergies considered that this arrangement warranted reconsideration given the low inflow assumption is more conservative and triggers a low supply alert when storage levels remain relatively high, at 296,000ML. Synergies proposed that the date of the imposition of supply restrictions under the DMP (four years from dam failure) be adopted as the threshold date for customers to confirm their contracted reservation volumes. GAWB's revised DMP incorporated Synergies' recommendation.

##### Other Jurisdictions

The New South Wales (NSW) Government's Metropolitan Water Plan (2006) adopted a demand assumption based on usage per capita per day of 426 litres. The NSW Government proposed that, once the drought was over and restrictions were lifted, a more accurate understanding of demand would be possible. The key factors seen to be influencing future water demand were population growth and demand trends such as the effects of urban consolidation, demographic and housing mix changes, improving appliance efficiencies and

new technologies. It further proposed regular re-assessments of demand projections as part of its adaptive management approach.

In its *State Water Plan 2007*, the Western Australian Government identified relevant factors that could increase water demand from irrigated agriculture, the resources sector and the household sector. Further, WA modelled a high and moderate growth scenario for each sector until 2030. The report does not address the issue of unexpected additional demand.

The QWC's Draft Water Strategy incorporates comprehensive demand forecasts over a 50-year period. Medium series population growth projections were derived from the Queensland Government Population Projections 2051, and a high series forecast was used for sensitivity testing. The QWC's demand forecasts took account of:

- permanent water savings arising as a result of the drought;
- effectiveness of potential demand management measures;
- changing demographic patterns, including the trend to smaller households; and
- ongoing compliance with rules and regulations.

The QWC's demand forecasts reflect a relatively smooth upward trend over time, from 478,000ML per year in 2005 (based on pre-drought trends) to 985,000ML per year in 2056. The forecasts also allowed for an increase in total urban demand (residential, industrial and commercial) on a per capita basis, from 468 litres per person per day in 2005 to around 500 litres by 2056. This compares with QWC's residential only target of 230 litres per person per day under non-drought conditions, and the target of 140 litres per person per day achieved under severe restrictions during the current drought.

The QWC proposed that the assumptions underpinning the demand projections continue to be reassessed and refined on an ongoing basis.

#### Stakeholder Submissions

No stakeholder submissions commented on demand assumptions.

#### The Authority's Analysis

In the Part (a) investigation, the Authority concluded that low and high demand scenarios needed to be considered to establish the circumstances under which GAWB's contingent supply strategy was prudent. The Authority generated demand scenarios based on information from GAWB and expert advice from Marsden Jacob Associates, with the lower demand scenario reflecting a preliminary assessment of new demands considered to have a high probability of proceeding.

In this regard, the Authority noted that:

- while it is important to have water available to meet the needs of current and prospective customers, overestimation of demand leading to earlier than needed augmentation (and consequent price rises) can adversely impact on the attractiveness of Gladstone as an industrial location; and
- there is a significant potential for demand forecasts to be inaccurate and it is appropriate that this uncertainty be taken into account.

The Authority recognises that GAWB's demand profile is different to other urban water supply entities, with potentially large and lumpy demand variations, and only about 20% of demand accounted for by residential and commercial use. Hence, GAWB's demand forecasts do not reflect a smooth trend line such as applies in SEQ. Particular observations made by the Authority in Part (a) were that:

- based on historical precedent, high demand scenarios are less likely; and
- there could be demand responses arising as a result of the price impacts of the proposed augmentation.

Although the revised Synergies demand forecast was for lower demand growth than in GAWB's previous drought model, the forecast remains higher than the Authority's low and high demand scenarios for 2008-09 and 2009-10 (Table 2.7).

**Table 2.7 Comparison of Demand Scenarios**

<i>Demand Scenario</i>	<i>2007-08</i>	<i>2008-09</i>	<i>2009-10</i>	<i>2010-11</i>	<i>2011-12</i>	<i>2015-16</i>	<i>2020-21</i>
QCA Demand 2005	49,906	52,764	58,177	60,459	61,197	64,307	67,762
Low Demand 2007	50,966	51,024	51,208	57,143	57,448	65,535	72,644
High Demand 2007	53,337	52,775	53,682	63,260	78,654	88,036	104,079
GAWB Initial Drought Model	56,607	60,733	70,000	70,000	70,000	70,000	70,000
GAWB Revised (Synergies)	53,056	53,229	56,970	61,955	64,559	70,000	70,000

The Authority notes that there is little difference in the low and high 2007 demand scenarios over the period to 2009-10 (table 2.7 refers). However, demand projections vary more substantially from 2010-11 onwards.

The Authority has previously recommended that the appropriate demand scenario for long term planning be that which reflects the low demand scenario (that is, planned demand – which includes the most likely amount that existing and prospective customers can be expected to contract) as well as an amount for future demand nominated by GAWB (for which GAWB carries the commercial risks) (QCA, 2005).

This would also seem appropriate for the purpose of triggering the low supply alert under the DMP.

However, under the DMP, upon declaration of a supply restriction (four years before projected failure), GAWB provides notice to customers that do not have a reservation, but who have demand included in forward projections, to elect to either secure their identified water demand by contract, or allow their identified water demand to lapse.

In addition, GAWB undertakes not to increase the volume of water it is obligated to supply upon the declaration of a low supply alert, until the low supply alert has ended.

The Authority notes that GAWB's criterion for commencing construction seeks to reflect current and future contracted demand. It appears likely that some of the planned demand may not have been contracted at the time restrictions are triggered under the DMP.



Accordingly, at the time supply restrictions are triggered, the forward demand projection should be adjusted to reflect contracted actual demand, including any curtailment arrangements and any known, contracted new demand.

In recognition that demand forecasts, when adjusted to reflect contracted actual demand, are more likely to be lower than those for long term planning, the Authority concludes that the relevant estimate of demand for triggering commencement of construction is the contracted actual demand at the time water restrictions are imposed. This can only be established at that time.

## 2.4 Drought Management Plan

### *GAWB's Submission*

GAWB submitted that, as a water service provider, the *Water Act 2000* requires it to register and comply with its Drought Management Plan (DMP). GAWB submitted that the DMP is the relevant mechanism for determining the trigger point for a supply augmentation in response to drought as:

- the DMP determines the timing of drought responses; and
- the DMP is designed to provide for the timely least cost augmentation of supply to mitigate the effects of drought.

Accordingly, GAWB considered that the DMP substantially reduces the likelihood of circumstances arising that would require the imposition of restrictions.

GAWB noted that the DMP must:

- be prepared in accordance with guidelines issued by the regulator (DNRW);
- have been developed in consultation with customers;
- be registered if it satisfies certain criteria;
- be reviewed by GAWB and updated periodically; and
- be subject to regulatory review and amendment.

GAWB acknowledged that registration does not constitute formal approval of the contents of the DMP. However, as the *Water Act 2000* stipulates that water service providers must comply with the drought management plan, GAWB argues that the DMP is therefore legally binding.

### *Stakeholder Submissions*

Callide Power Management (CPM) submitted that GAWB's DMP is presented as a 'legally binding' plan 'approved' by the relevant regulator. CPM was concerned that the parameters in the DMP are inappropriate, and that GAWB 'unilaterally amended its DMP in mid-2007, providing only a limited window for customer consultation'.

CS Energy (CSE) stated that it is not clear if directions given by GAWB under its DMP are really binding on CSE. CSE also questioned the validity of a poorly constructed and implemented DMP, especially if it considers there are demonstrably better alternatives.

### *The Authority's Analysis*

GAWB's criteria rely heavily on various assumptions which are set out in its DMP. As GAWB argues that the DMP is legally binding and is the relevant mechanism for considering supply augmentation in response to drought, the Authority considered that the legal status of the DMP must be clarified. For example, any recommendations by the Authority regarding GAWB's criteria may be constrained if the DMP has legal precedence.

Legal advice to the Authority is that the *Water Act 2000 (Qld)* does require a water service provider to develop and comply with their DMP when supplying water services to the service provider's customers.

The legal advice is that, while the *Water Act 2000* makes the DMP binding upon GAWB, the *Water Act 2000* does not restrict the Authority's recommendations regarding GAWB's pricing practices. Further, the Authority has been advised that it was "perfectly permissible for the Authority to make recommendations about GAWB's pricing practices ... which if accepted and implemented would require changes to GAWB's DMP."

Following receipt of this advice, GAWB further advised the Authority that it must comply with the DMP and failure may result in a contravention of the *Water Act 2000* and possible imposition of a prescribed penalty. GAWB suggested that the prime purpose of the DMP is to articulate how GAWB would exercise its powers under the *Water Act*, and that customers are contractually required to comply with the DMP.

Based on further legal advice, the Authority considers that, technically, it is section 388 of the *Water Act 2000* that allows GAWB to impose water restrictions on customers rather than the DMP. Section 388 does not deal with drought supply augmentation.

However, the Authority does accept that the DMP, once in place, is contractually binding on those customers who have agreed to the terms of the standard contract.

In conclusion, the Authority accepts its legal advice that the registration by DNRW of a DMP does not imply approval of the contents of the DMP. Therefore, subject to the Ministers acceptance of them, the DMP should be amended to reflect the Authority's conclusions.

### 3. CRITERIA FOR UNEXPECTED ADDITIONAL DEMAND TRIGGERS

*GAWB's criterion for augmentation in response to unexpected additional demand is:*

*“to trigger construction of the appropriate augmentation when GAWB has entered into contracts with customers that exceed the capacity of its water sources, after allowing for distribution losses and contingency”.*

*GAWB's criterion is considered appropriate as it seeks to ensure adequate supply to meet demand. GAWB recognises the need for demand to be underpinned by contracts in order to justify costly augmentation and allow GAWB to recover its costs.*

*In relation to the assumptions underpinning GAWB's criterion, the Authority concludes that:*

- *supply capacity is a relevant assumption and should reflect the amount of water available for supply, presently the current interim HNFY of 70,000ML, as set by DNRW;*
- *rather than the 5% allowance proposed by GAWB, an allowance of 3% of distributed volume for system losses seems appropriate. Such a level is consistent with the apparent level of losses currently being recorded by GAWB and noted as a target objective in GAWB's System Leakage Management Plan. A more holistic approach to addressing system losses would also include losses from the reticulation system operated by Gladstone Regional Council; and*
- *GAWB's proposed reserve of 5% of HNFY seems unnecessary as:*
  - *variations in existing customers' demand can be managed under contracts with those customers and using excess capacity. Available historical data provides no evidence of actual demand exceeding contracted demand to justify a contingency reserve;*
  - *given the relatively short lead time and significant supply volume of the proposed Fitzroy pipeline, a contingency reserve is not necessary to be included in the augmentation trigger at this time; and*
  - *an ex-post response to a downgrade in hydrology is more appropriate way of managing this risk than a permanent downgrade through a contingency reserve.*

#### 3.1 Definitions, Objectives and the Criterion

*GAWB's Submission*

GAWB submitted that its demand environment is unique, with a predominantly industrial customer base and lumpy new demand. GAWB considers this environment poses challenges for water planning and investment.

For the purposes of the criterion, GAWB:

- **defined** unexpected additional demand as:

*demand that is beyond the available capacity of sources<sup>3</sup> (taking into account distributional losses and contingency) that have been approved by the Authority for inclusion in GAWB's regulated asset base for pricing purposes;*

- seeks to ensure the following **objectives** are achieved in the event of unexpected additional demand:
  - water will be available to current and prospective customers when required; and
  - GAWB can invest in the source augmentation to meet these demands and recover its costs; and
- proposed the following **criterion** to respond to an event of unexpected additional demand:

*to trigger construction of the appropriate augmentation when GAWB has entered into contracts with customers that exceed the capacity of its water sources, after allowing for distribution losses and contingency.*

GAWB further indicated that preparatory expenditure is required to have a readily deployable water source available to meet the two- to three-year period between contracts becoming binding, and the customers' requirement for water.

#### *Other Jurisdictions*

The Authority has not identified any comparable statements of objective or criteria for managing unexpected additional demand in other jurisdictions.

In other major urban centres, demand is typically projected in a smooth trend over a designated planning period, with unexpected variations to planned growth mainly addressed through regulatory reset processes. Augmentations to infrastructure considered necessary to meet planned growth are typically identified by:

- reference to a desired level of service. For example, the Draft SEQ Water Strategy (QWC, 2008) has a level of service (LOS) objective under normal operations of ensuring that sufficient grid water is available to meet a benchmark average total urban demand per capita; and
- adaptive planning. For example, the NSW Metropolitan Water Plan (2006) indicated that, given the unavoidable level of uncertainty in key parameters, an adaptive approach is essential. Regular re-assessments are required of demand projections, estimates of supply availability and other factors in the supply and demand balance. The focus of the NSW Plan was to secure Sydney's growing water needs in the face of drought and potential climate change.

In some jurisdictions, there is a particular focus on continued monitoring of climate change and its impacts (see for example, the South Australia (SA) Government's *Waterproofing Adelaide* (2005) and the *Sustainable Water Strategy for the Central Region of Victoria* (Victorian Government, 2005).

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<sup>3</sup> In its initial submission GAWB referred to 'existing' sources. This has since been clarified as referring to any sources (existing or within the planning period) that have been approved by the Authority.

### *Stakeholder Submissions*

CS Energy was concerned that GAWB's term 'unexpected additional demand' implies there would be insufficient time in which to take steps to deal with additional demand and so extra water must be arranged before it is required or anticipated. CS Energy considered this had the appearance of a contrived justification.

RTA submitted that GAWB should be limited in its capacity to contract for new demand that would result in acceleration of dam failure and interruption of supply to existing customers.

### *The Authority's Analysis*

#### GAWB's Operating Environment

The Authority has often commented on the lumpy nature of demand (and supply) confronting GAWB (QCA, 2002, 2005). The Authority accepts that GAWB's demand environment with its strong industrial focus and lumpy demand increments represents a planning challenge as there is the potential for unexpected additional demand to represent a substantial diversion from (then) current demand forecasts.

These characteristics indicate that the timing of an augmentation is a key issue. The gestation period for new projects has historically allowed sufficient time for GAWB to plan, procure and manage construction of necessary capacity augmentation. However, the Authority accepts that circumstances could require planned options to be reconsidered where demand changes unexpectedly and significantly.

#### GAWB's Objectives

Essentially, GAWB seeks to ensure that demand and supply are met over the longer term and that GAWB can confidently invest to achieve this outcome. Such objectives are consistent with GAWB's charter and responsibilities.

#### Definition of Unexpected Additional Demand

GAWB's definition of unexpected additional demand focuses on demand beyond the capacity of sources that have been approved by the Authority.

The Authority has, in the past, recommended that the most cost effective infrastructure sufficient to meet planned demand over a 20-year period be incorporated in prices. Planned demand has been defined to include anticipated customers contractual requirements (that is, the most likely amount that existing and prospective customers can be expected to contract) as well as an amount for future demand nominated by GAWB (for which GAWB carries the commercial risks) (QCA, 2005).

Current pricing practices incorporate existing and future infrastructure relevant to planned demand over the next 20 years.

The Authority notes that it is the Ministers (and not the Authority) who 'approve' pricing practices and by implication the sources of supply and associated infrastructure.

In response to CS Energy's comment that the term 'unexpected demand' has the appearance of a contrived justification, the Authority notes that GAWB's proposed construction trigger requires that new demand be contracted. GAWB is proposing to augment supplies only when there is a firm commitment from new customers. The Authority would add that this

commitment from new customers must justify the augmentation on commercial grounds. As GAWB proposes to commence the process for responding at the time the low supply alert is triggered, there should in the future be sufficient time to consider all relevant options, as outlined in chapter 2.

In summary, the Authority accepts that unexpected additional demand is, by definition, demand which exceeds planned demand at a point in time. However, whether the unexpected additional demand requires changes in the timing, scale or type of infrastructure (temporary or permanent augmentation) requires consideration (see below and chapter 4).

#### The Criterion

To achieve GAWB's objectives, it is essential that sufficient supply is available in the event of unexpected demand.

For this purpose, sufficient time is required to assess the most appropriate response and sufficient commitment from customers is required to warrant the expenditure (particularly where the required response imposes unexpected costs on existing and committed future customers). In respect of this latter matter, it is noted that GAWB proposes that any augmentation only occur after GAWB has entered contracts for customers for this purpose.

As indicated above, the Authority would add that this commitment from new customers must be sufficient to commercially justify the augmentation. That is, the impact of the proposed augmentation on GAWB's viability and ability to recover costs, as well as any potential impact on the prices charged to other existing customers, need to be taken into account. Pricing issues are to be considered in Part (c) of the investigation.

The Authority also notes that, under the current Boyne River Basin Resource Operation Plan (ROP), GAWB can only contract for additional demand from currently available supply as defined by the safe yield. This could constrain the response options to:

- sales from the balance of currently uncontracted supplies from Awoonga Dam;
- manufactured water such as desalination and recycling; and
- water from the Fitzroy Basin for which GAWB has current allocations.

However, the Authority's legal advice indicates that it is a reasonable interpretation of the wording of the ROP that GAWB could enter into water supply agreements, provided any water supply commitments under that agreement that resulted in GAWB's total commitments exceeding yield were contingent upon the yield reaching the required level (or the ROP being amended to allow such supply).

In regard to RTA's comment that GAWB should be limited in its ability to contract for new demand that would bring forward supply restrictions or dam failure, the Authority notes that GAWB reserves the right not to contract for new demand once the low supply alert is triggered under the DMP. Whether new demand should be contracted is a commercial decision and one which should be taken in the light of all other factors being considered as part of GAWB's proposed process for considering when to trigger the commencement of construction.

In summary, the Authority concludes that GAWB's criterion for triggering augmentation in response to unexpected new demand once contracted is appropriate, provided that the commitment from new customers is sufficient to justify the augmentation.

## 3.2 Assumptions

The assumptions underlying GAWB's criterion for augmentation in response to unexpected additional demand relate to supply capacity, distribution losses and a contingency allowance. Assumptions identified as relevant to drought such as inflows and storage losses are just as relevant, but are accepted as being taken into account in the consideration of supply capacity in the case of unexpected additional demand.

### *Supply Capacity*

#### GAWB's Submission

GAWB indicated that its supply capacity is limited to the current HNFY of 70,000ML, which increases to 78,000ML when the dam first fills to 40m. GAWB further submitted that, if the HNFY is revised downward in the Water Resources Plan for the Boyne River Basin, GAWB's allocation is likely to be correspondingly reduced.

GAWB suggested that the 70,000ML allocation should be adjusted to allow for distribution losses and contingency.

#### Other Jurisdictions

The consideration of supply capacity was a key focus of the Draft SEQ Water Strategy (2008), which identified an available yield from existing dams and weirs of 416,000ML per year, or 20% less than previously thought available. A scenario of a 10% reduction to 374,000ML per year due to climate change was also considered.

The NSW Metropolitan Water Plan (2006) indicated that available annual supply from the storage system was reduced from 605,000ML per year to 575,000ML per year in recognition of lower inflows and more accurate modelling.

#### Stakeholder Submissions

CPM submitted that it was concerned that the trigger definition may result in an augmentation being developed to meet aggregate contracted customer demand of just more than 70,000ML per year, when the additional supply requirement could have been delivered using existing assets.

#### The Authority's Analysis

The Authority notes that, in other jurisdictions, the system safe yields have been reduced mainly as a result of reduced inflow expectations. In GAWB's case, the Awoonga Dam safe yield was reduced by DNRW from 87,900ML per year to 78,000ML per year in 2003 due to reduced inflows. In 2003, DNRW set the interim HNFY at 70,000ML to reflect the available supply of water. Therefore, the implications of lower inflows in the years leading up to 2003 have been taken into account by DNRW in the full and interim HNFY. The risk of future downgrades remains due to the lower inflows recorded since (2005-2007), ongoing climate variability and improved modelling. The Authority notes that any changes to inflows arising from these factors should be taken into account by DNRW as they occur.

In regard to CPM's comment, the Authority notes that GAWB's proposal allows for a prudent consideration of alternative responses (rather than only augmentation) such as demand management or curtailment and needs to be considered in the context of their costs and benefits. Also of relevance is whether demand is temporary or permanent.

Accordingly, the Authority concludes that supply capacity is relevant and that it should reflect the amount of water established by DNRW as being available for supply, rather than the amount of water that could be available once the dam fills. The relevant benchmark for supply capacity is the HNFY as set by DNRW. Currently, this is the interim HNFY at 70,000ML per year. When the dam fills, the HNFY will rise to 78,000ML per year. Should further downgrades be considered necessary due to the further impact of climate variability then this latter amount would be most relevant.

Issues related to distribution losses and contingency are addressed below.

### *Distributional Losses*

#### GAWB's Submission

GAWB's criterion for triggering construction in response to unexpected demand incorporates an allowance for distribution losses. GAWB proposes distribution losses of 5% of the total volume supplied through GAWB's distribution system. Currently, the total allocation supplied is 42,000ML per year, 5% of which is 2,100ML. In effect, GAWB proposes an average distribution efficiency of 95%.

GAWB noted that this contrasts with the present loss allowance of 10%, submitted to DNRW in its System Leakage Management Plan (SLMP). However, GAWB proposed that the 5% allowance is consistent with loss factors applied for other bulk industrial pipeline systems owned by SunWater. GAWB suggested that loss allowances may be reviewed at price resets using updated performance data and benchmarks.

The Authority sought additional information from GAWB in relation to its SLMP, which indicates that:

- system losses arise from unauthorised water usage, authorised but unmetered water usage, meter error (estimated at 2%) and physical loss of water from leaks and evaporation; and
- in 2006-07, total system losses were 9.3% of water released from Awoonga Dam. In separate advice, GAWB noted that the level of system losses varies from year to year, and was 6.3% in 2005-06.

GAWB indicated that the replacement of mechanical flow meters with electro-magnetic flow meters should allow more accurate metering across the system. Pipeline pressure reduction is another strategy proposed to reduce losses, while segmentation of metering by sector will assist to identify leakages and unauthorised use. Overall, according to the SLMP, GAWB aims to reduce losses to about 3% of dam release volume over a five-year period to 2013.

#### Other Jurisdictions

The Draft SEQ Water Strategy (QWC, 2008) established a bulk transport and network distribution system loss target of no more than 8% of total urban water use. The Strategy identified system losses from fire fighting, theft, inaccurate metering and leakage as accounting for 14% of urban demand in 2005, and that this would be reduced through pressure and leakage reduction and the design and management of new distribution infrastructure. It was noted that the 8% target represented best practice based on industry benchmarking for system losses.



### Stakeholder Submissions

CPM submitted that a supply augmentation trigger should be based on an allowance for reasonable and efficient distribution losses. CPM expected that the level of allowance for such losses would be considered by the Authority.

RTA was concerned that GAWB's assumption of a reduction in distribution losses from the current 10% to 5% may not be achieved, and that this could delay augmentation.

### The Authority's Analysis

The issue of distribution losses was reviewed in the Authority's 2005 investigation. In that investigation, the Authority commissioned the Snowy Mountains Engineering Corporation (SMEC) to optimise GAWB's asset base and identify efficient operations costs. SMEC's report included an assessment of losses within the system.

In that investigation, SMEC benchmarked losses within other Australian Water Authorities. According to available data, bulk water supply systems with roofed, tank type storages, similar to GAWB's system, normally exhibit very low system losses, in the order of less than 1% to 2% (SMEC 2005).

QWC's benchmark relates to urban systems including reticulation, which do not form part of GAWB's supply system but is provided by Gladstone Regional Council. While GAWB has focused on distribution losses within its own supply system, the losses in the Council's reticulation system will also be relevant to identifying a demand response trigger. For example, a reduction in Council's system losses would reduce their demand on GAWB's supply. For this reason, a more holistic approach to system losses which reviews the prospects for improved leakage management across the supply chain to customers is desirable.

In its assessment of GAWB's system losses, SMEC indicated that:

- GAWB's main conveyance pipe was in excellent to good condition and various inspections did not identify any noticeable signs of leakage;
- GAWB's 2.0 breakages per 100 kilometres of pipeline compared to the national average of 25.7. This suggested that GAWB's system was in good condition and well maintained and operated; and
- GAWB's losses could not be precisely measured until more accurate metering was installed.

In the 2005 investigation, the Authority used SMEC's conservative benchmark of system losses of 2% in its modelling for its recommended pricing practices.

The Authority notes that SMEC's benchmarked system losses only took into account system leakages and evaporation. SMEC did not take into account meter inaccuracy or unauthorised use.

The Authority re-commissioned SMEC to provide comment on GAWB's SLMP in light of SMEC's previous analysis. The advice from SMEC was that GAWB does not appear to have a leakage problem, but rather a meter accuracy problem. SMEC suggested that the key is to improve the operation of the meters, including possibly installing two new meters, and to have a leakage monitoring system properly developed including pressure and flow Supervisory Control and Data Acquisition (SCADA).

SMEC concluded that, for planning purposes, the leakage allowance should be a maximum of 3% which it considered is already being attained, based on a pro rata assessment of losses recorded so far in 2007-08. The 3% allowance comprises a 2% allowance for meter inaccuracies with the balance for unauthorised consumption, authorised unbilled consumption and actual leakage.

The Authority notes that GAWB's submission proposed a 5% level of distribution losses, and that this is:

- less than current total losses of 10% as set out in its SLMP; and
- higher than GAWB's own longer term target of 3% and apparent current distribution system losses of 3%.

The difference between 5% and 3% of potential distributed volume is 840ML.

The Authority concludes that a more accurate allowance for system losses of 3% as suggested by SMEC should be adopted for this purpose. This would be accounted for in estimating the demand trigger.

### *Contingency*

#### GAWB's Submission

GAWB's criterion for triggering construction in response to unexpected additional demand incorporates a provision for contingency reserve (headroom). GAWB proposes a contingency reserve of 5% of GAWB's current HNFY (70,000ML, 5% of which is 3,500ML).

GAWB considered that a contingency reserve is necessary because:

- it is common practice for water service providers to retain a small surplus above allocation to account for day-to-day variations in demand;
- it provides scope for customers to use more than their water reservation in a particular year, given that customers can use up to 10% more than their reservation volume without incurring penalty charges;
- it enables GAWB to meet a sudden unforeseen spike in demand; and
- there is a risk that GAWB's volumetric entitlement from Awoonga Dam could be revised downwards.

GAWB proposed that, if the trigger for augmentation was breached by only a small volume, and there was no or little prospect of additional short-term demand, it may be prudent to supply the new small demands from the contingency volume or from an alternative small volume source.

#### Other Jurisdictions

The Metropolitan Water Plan for Sydney (NSW Government, 2006) compares supply and demand forecasts for Sydney. It applies a safety margin of 30,000ML to the total supply of 575,000ML (5.2%). The Plan estimates that Sydney has sufficient water to meet its needs until 2015, when demand is estimated at 542,000ML and supply at 575,000ML. The safety margin is intended to offset the risk of error in estimates of demand and supply.

The Draft SEQ Water Strategy (QWC, 2008) did not include a contingency reserve. However, the estimated safe yield of 416,000ML per year reflected a 'cautious' approach in the new planning framework. A scenario was also reviewed incorporating a 10% reduction in yield to take account of possible effects of climate change.

The concept of headroom is used in the United Kingdom (UK), where water businesses must report to the regulator, Office of Water Services (Ofwat), on target and available headroom as part of the security of supply index. Target headroom is defined as the threshold or minimum acceptable level of difference between dry year demand and available supply. Surplus headroom exists where the available headroom exceeds the target level. Deficit headroom exists where available headroom is smaller than the target level, which triggers an increase in supply.

#### Stakeholder Submissions

CPM submitted that GAWB's proposed 5% contingency reserve appeared somewhat arbitrary. It noted that, if maintained in perpetuity, the contingency reserve would require GAWB to permanently hold, and for customers to pay for, more capacity than is required at any point in time.

CPM further proposed that, at a minimum, GAWB should demonstrate that the contingency reserve is reasonable and appropriate, by quantifying each of its reasons (as listed above). While these were considered by CPM to be uncontroversial, it was not clear that they collectively required GAWB to hold a 5% contingency. For example, CPM noted that some customers historically used less than their full contracted reservation volume.

#### The Authority's Analysis

The key purposes for GAWB's contingency reserve are to manage short-term variations in customer demand, new demand growth and supply downgrades.

##### (a) Short Term Variations in Existing Customers' Demands

In the 2005 investigation, the Authority recommended, and the Ministers accepted, that GAWB should apply load factors or penalty charges where industrial customers' demands exceeded contracted volumes on an annual basis. These load factors were:

- 25% to apply to the total charge for incremental volumes where actual consumption is between 110% and 125% of the contracted amount; and
- 50% to apply to the total charge for incremental volumes where actual consumption is higher than 125% of the contracted amount.

For councils, the Authority recognised the greater inherent difficulties in forecasting demand. The Authority therefore recommended that a 10% load factor apply where actual consumption exceeds 125% of contracted volumes.

The basis for this approach was to provide certainty for GAWB in regard to contracted volumes and to shift the risk of short-term demand variations to the customers. In this way, the cost of managing customer demand variations is attributed to the relevant customer, rather than across all customers as would be the case if the cost of a contingency allowance was shared across all customers.

It is noted, however, that customers could increase demand by up to 10% without triggering a penalty charge (or by up to 25% in the case of the Councils). Where customers repeatedly

increase demand up to the threshold, GAWB should actively manage contracts to ensure that reservation volumes are adjusted appropriately.

In this regard, the Authority recognises that there could be an incentive for customers to understate their demand needs by up to 10% and that a contingency provision may be a prudent approach to manage this risk.

However, available data indicates that actual demand has been less than that contracted from 2001/02 to 2007/08. On an annual aggregate basis, actual demand has been 13% to 29% less than that contracted over this period. This may reflect prevailing take-or-pay arrangements which are set at varying levels below 100% for many of GAWB's customer contracts. On a customer basis, only one customer's actual demand has exceeded contracted demand. When this has occurred, the additional demand could be accommodated by lower than contracted demand from other customers. That is, total actual demand still fell below that contracted for. Customers bear the risk of actual demand being less than that contracted under existing take-or-pay contracts.

In essence, it appears that some customers ensure water is available by having a large buffer in their own contracted demand. They typically use much less than contracted. GAWB can use this buffer to meet short term daily and annual variations in other customers' demand.

Therefore, available data does not support the need for a contingency reserve to deal with short term variations in customer demand. It is likely that some customers will continue to reserve more water than they use as for them this remains an appropriate strategy.

The Authority accepts that it is possible that, in the future, under new contractual arrangements, the aggregate of customers' short term needs may exceed aggregate reservation volumes.

However, the Authority considers that available data does not currently support the need for a contingency reserve to manage short term variations in demand.

#### (b) New Demand

In the case of unexpected new permanent increases in demand, the critical issues are:

- the time required to provide additional water. Lead time is required for planning, approvals, construction, filling and supply;
- the time for a new customer to reach full contracted demand levels; and
- the volume of demand growth. Unlike most water businesses, GAWB's demand growth can be lumpy and represent a substantial percentage increase on current demand. However, demand growth may comprise only a small percentage of the next planned augmentation.

The Authority considers that a contingency reserve is not required where the lead time for augmentation (including filling) is less than (or equal to) the lead time for new customer demand. Where preparatory works are already in place, potential augmentation on a just in time basis can be a quicker and cheaper way of dealing with the risk of new unexpected demand. Furthermore, as noted above, demand has typically been between 13% and 29% below contracted levels and can assist in meeting short term supply imbalances.

In the current circumstances, the Authority notes the proposed next augmentation is the Fitzroy pipeline. Depending on the size ultimately determined, the pipeline can deliver a significant volume of water in a relatively short timeframe – within two years of the decision to commence

construction once preparatory works are in place. It is unlikely that an unexpected new customer would need more than 30,000ML supply within two years, particularly in view of the short term surpluses identified above.

Given the current situation, the Authority therefore considers that a 5% contingency reserve of 3500ML/year to manage unexpected new demand is not necessary. An additional contingency reserve would be a 'doubling up' of the currently proposed contingent supply strategy, adding unnecessarily to service costs.

The Authority accepts that a contingency reserve may be required where the lead time for augmentation is much longer. The level (or percentage) of contingency reserve should take into account the probability of new demand, its volume and the lead time to the next augmentation. The required contingency allowance may be greater than 5% (or 3,500ML) in some instances.

In the Authority's 2002 investigation, GAWB's next augmentation was a further raising of Awoonga Dam. A total lead time of six to eight years was required to ensure that the raising was completed and filled before the need to meet demand. On this basis, the Authority noted that a 'capacity cushion' of 5,500ML/year remained available by 2020/21 under the demand and supply assumptions of the time. This provided a sufficient planning window for future augmentation.

In the 2005 investigation, the Authority recommended a 'just-in-time' approach in regard to lead times for storage capacity augmentation. Under this approach, an augmentation would be commenced to allow sufficient time for planning and construction, and filling if relevant, just in time to meet increasing demand.

In summary, the Authority accepts the principle of a contingency allowance in the augmentation trigger to deal with unexpected demand, but this should be established taking into account relevant timing and volume risks and other prevailing arrangements. Given the relatively short lead time and significant supply volume of the proposed Fitzroy pipeline, a contingency reserve is not considered appropriate at this time.

#### (c) Downgrades in Supply

As noted above, the Authority accepts that a hydrological downgrade could result from climate change or changes to the method used for estimating safe yield.

If a contingency reserve of 5% is provided to cover a potential downgrade, as proposed by GAWB, this implies a permanent de facto downgrade with costs met by all customers.

The Authority considers that GAWB should be able to monitor the potential for any downgrades in safe yields in conjunction with DNRW, to provide some early warning of an impending revision. Moreover, as noted above, hydrological changes occur infrequently and ex-post responses are generally appropriate.

#### (d) Other Issues

CPM suggested that GAWB quantify how the contingency reserve is justified by each factor GAWB has raised. While the Authority considers that provision of a 5% contingency is not necessary under current circumstances, where circumstances change and a contingency reserve is justifiable then the level of contingency attributable to each legitimate risk factor should be identified. At that time the fact that the risks and their responses are not necessarily additive but may be mitigated by a single contingency provision would need to be taken to account.

In regard to the issue raised by CPM that existing customers would have to meet the cost of the contingency allowance, the Authority considers that the costs of an augmentation attributable to existing customers as against new customers should be further reviewed in Part (c) of the investigation.

#### Conclusions

In GAWB's current circumstances, the proposed reserve of 5% of HNFY (which amounts to 3,500ML) seems unnecessary as:

- variations in existing customers' demand can be managed under contracts with those customers and using excess capacity. Available historical data indicates actual demand lies well below contracted demand. There is no evidence of actual demand exceeding contracted demand to justify a contingency reserve;
- given the relatively short lead time and significant supply volume of the proposed Fitzroy pipeline, a contingency reserve is not necessary to be included in the augmentation trigger at this time; and
- an ex-post response to a downgrade in hydrology is a more appropriate way of managing this risk than a permanent downgrade through a contingency reserve. GAWB should be able to monitor the potential for any downgrades in safe yields in conjunction with DNRW.

#### 4. REVIEW OF GAWB'S PROPOSED PROCESS

*In its initial submission to the Authority, GAWB proposed a general process to be applied when assessing the appropriate response to drought or unexpected additional demand. The Authority considers that GAWB's proposed process is reasonable for general application.*

*GAWB's proposed process and the Authority's conclusions are:*

- *Planning - the Authority accepts GAWB's proposed process of five-yearly reviews of strategic water plans and an adaptive and consultative management approach involving annual updates if required;*
- *Notice – the Authority considers that the proposed nature of the notice is appropriate. In regard to drought, the notice to customers should be widened to invite customer feedback taking account of the latest inflow data, supply information, and most recent demand forecasts;*
- *Customer responses - the Authority considers that up to 120 days should be allowed to provide sufficient time for customers to prepare detailed responses and for GAWB to then analyse options and have up to six months lead time to undertake any necessary preparatory work and reach contractual agreement;*
- *Evaluation and option selection - The Authority considers that the process should require customers to provide any submissions which could forestall the need for augmentation in a cost effective manner. The Authority also considers that GAWB should undertake a broader analysis of the relevant options and, if necessary, provide relevant details to Ministers for consideration as to whether a less-commercial option may be warranted. The analysis should be supported by an NPV of the commercial benefits of each option. Where Ministers propose that GAWB undertake a less-commercial option then GAWB should be provided with a relevant CSO. Otherwise, GAWB should implement the most commercially beneficial option;*
- *Ex-ante evaluation – In regard to GAWB's request for the Authority to provide guidelines that could be employed as part of an ex-ante approval process the Authority notes that:*
  - *the previously approved review trigger arrangements may apply where the investment results in an increase in aggregate revenue greater than 15%. However, a Ministerial Direction would be required to allow the Authority to proceed;*
  - *guidelines have been provided in some of the Authority's previous reviews. However, the Authority cannot give binding ex-ante guidelines under Part 3 of the QCA Act 1997; and*
- *Construction trigger - The Authority accepts that it is GAWB's responsibility to demonstrate compliance with the process leading up to the construction trigger.*

##### 4.1 GAWB's Submission

As part of its submission relating to the criteria for triggering the commencement of construction of an augmentation, GAWB proposed a general process to be applied to either drought or unexpected demand (with only minor differences in application). The process focused upon planning and procedural issues (including consultation), and option evaluation and selection.

GAWB also identified specific timings and actions for its proposed process to respond to the drought prevailing at the time of its submission. Since GAWB's initial submission, GAWB has confirmed that the low supply alert has been withdrawn and the timetable initially proposed for the drought response no longer has application. Accordingly, the Authority's analysis focuses on the key steps relating to the general process.

## 4.2 Planning

### *GAWB's Submission*

GAWB's planning process has in the past responded to events such as increases in demand on an as needs basis. GAWB now proposes that planning be undertaken on a regular basis aligning with five-yearly price reviews. Nevertheless, GAWB also proposes that plans may be revised more frequently or involve updates as new information emerges.

As part of the planning process, GAWB proposes that cost benefit analysis be applied to determine the most appropriate augmentation at any given time, and that customers be provided with information on the timing, cost and price impacts of possible augmentations. Further, GAWB proposes that the planning process includes consultation with customers and calling for non-infrastructure proposals.

### *Other Jurisdictions*

Throughout Australia, the role of government agencies and water service providers in relation to planning varies. In some cases, water service providers are directed by State Governments as to the planning framework within which services are to be provided. In other instances, water service providers submit plans for consideration by State Government.

In general, due to the impacts of the recent drought and concerns about possible climate change, State Governments have played a more directive role. For example, the NSW Government's Metropolitan Water Plan (2006) provides an overarching planning framework, including specifying the nature of the infrastructure to be provided.

The length of the planning period also varies. However, there has been a recent trend to the adoption of more adaptive planning processes. For example:

- the Sydney Metropolitan Water Plan covers a 25-year period and is expected to be reviewed every four years;
- the Waterproofing Adelaide Plan extends for 20 years and is to be reviewed every five years; and
- a 50-year planning horizon was adopted by the QWC for the Draft SEQ Water Strategy and by the Victorian Government for the Central Region Sustainable Water Strategy. The QWC proposed that the Plan would be reviewed on a five-yearly cycle, but would apply an adaptive approach to planning and regular updating of water balance assessments.

While planning in most States generally involves a high level of stakeholder consultation, predominantly through the release of draft reports and a formal consultation process, some variation does exist. For example, plans such as the Central Region Sustainable Water Strategy (Victorian Government, 2006), Waterproofing Adelaide (SA Government, 2005) and the SEQ Water Strategy (QWC, 2008) were released initially in draft form for consultation. The NSW



Metropolitan Water Plan, on the other hand, is subject to review by an independent panel in regard to its progress in implementation.

The various plans typically define a series of actions or strategies in relation to water conservation, demand management, surface water or groundwater augmentation, recycling options and desalination.

Most water service providers and their state regulators adopt co-incident planning intervals of five years with some variations.

Regulators' roles in reviewing and approving proposed augmentations in response to drought or demand vary between the States. Independent Pricing and Regulatory Tribunal (IPART), Independent Competition and Regulatory Commission (ICRC) and the ESC have powers to approve or not approve proposed augmentations, although in the case of Government directed drought responses, these regulators focus on the efficiency of the cost incurred rather than the nature of the augmentations.

#### *Stakeholders' Submissions*

In the light of price risk exposure presented to customers, RTA recommended that GAWB prepare a far more detailed project development plan for augmentation, with further definition and refinement of project scope, cost estimates, execution strategy and implementation plan.

CPM commented that, due to substantial rainfall, there is no near-term requirement for the Fitzroy River Pipeline project, on either supply augmentation or drought contingency grounds and therefore submitted that GAWB must re-evaluate its timetable for the Fitzroy River Pipeline and immediately discontinue any planned construction or significant preparatory expenditures.

CS Energy also limited comments to the process preceding the construction of the Fitzroy River Pipeline and submitted that the recent rains have provided GAWB with a useful opportunity to spend more time discussing options with its customers, selecting and pricing augmentation options, as well as ensuring that it has thoroughly costed the Fitzroy River Pipeline option.

#### *The Authority's Analysis*

Under the *Water Act 2000*, GAWB is clearly required to plan future water supply capacity, reliability and quality.

The Authority has previously recognised that GAWB's demand growth is driven by (potentially) large and lumpy industrial demand with uncertain timing (2002). These circumstances have not changed. The Authority is of the view that long term (20 year) demand and capital investment planning is essential for GAWB.

Long term planning should be based on clear assumptions, supported by historical trends and incorporating informed views about future technological and climate implications, and recognising the limitations of broader regional resource capabilities.

The updating of those plans for review every five years (in line with the price reviews) is consistent with such a process. Price reviews are dependent upon assumptions relating to planning and the most appropriate infrastructure responses. Ensuring that such a planning process is completed prior to each price review would ensure their relevance to the price review.

The Authority notes GAWB's suggestion that plans may need to be updated in the interim to take account of new information. This adaptive approach is similar to that proposed by other jurisdictions. Further, the lead times related to triggering augmentation for both drought and

demand should ensure that such plans are current for most of any five-year price review cycle and such a possibility should not impose unnecessary costs.

The Authority also notes that the emphasis accorded by GAWB to consultation with customers (including pricing information). Such consultation is considered to be particularly important for the effectiveness of the planning process as it ensures that the most recent information is incorporated on all possible demand management and supply options (QCA, 2007). It also allows the customers to respond to potential changes in prices and to consider their requirements and contractual implications. At the same time, the consultation must be effective and provide sufficient time for an iterative process to be undertaken.

The National Water Initiative (NWI), an intergovernmental agreement between the Commonwealth and the States (NWC, 2004), sets some principles and guidelines for water planning. Under these principles, the duration of a plan should be consistent with the level of knowledge and the development of the particular water source. In the case of ongoing plans, there should be a review process that allows for changes to be made in the light of improved knowledge.

GAWB's Strategic Water Plan (SWP) was prepared in 2004. GAWB now has an opportunity to develop a new Strategic Water Plan, taking account of recent information, and to be completed in time for the 2010 regulatory review. In a submission to the Authority in response to stakeholder comments, GAWB indicated that it proposes to release a new Strategic Water Plan in 2008-09. The Authority considers this to be appropriate and consistent with the NWI given the potential for changed information since the 2004 Plan.

The Authority therefore concludes that long term strategic water planning, with major reviews at five-yearly intervals, in line with regulatory reviews, is an appropriate approach. The Authority also supports an adaptive and consultative management approach involving updates of the strategic plan to accommodate significant new information, such as may emerge in regard to climate change.

### 4.3 Notice

#### *GAWB's Submission*

GAWB submitted that, where circumstances indicate that a departure from a five-yearly plan is required, customers are to be notified of the event, the proposed response and the estimated pricing implications. In addition to the notification, GAWB would invite customers to submit proposals for alternatives that might deter augmentation.

In regard to drought, the timing of this notice was proposed to coincide with the triggering of the DMP (the low supply alert), five years before expected dam failure.

In regard to unexpected additional demand, GAWB proposed that notice would be given when GAWB forms the view that demand would reach the trigger level (as defined by their criterion outlined in Chapter 3). This would arise from GAWB's regular planning cycle or from a sudden change in circumstances.

#### *Other Jurisdictions*

The Authority has been unable to identify any similar practice to that proposed by GAWB in other jurisdictions. The Authority does note that, in preparing its Draft SEQ Water Strategy, the QWC (2008) appraised the community of the options necessary to address the prevailing drought conditions. Similar approaches were adopted by the SA Government (Waterproofing

Adelaide, 2005) and the Victorian Government in its Sustainable Water Strategy for the Central Region (2005).

In the case of the NSW Government's Metropolitan Water Plan (2006), appropriate responses were developed using a collaborative process relying on cross agency planning, commissioning specific strategy assessments and extensive work by the service providers. Under the adaptive management approach adopted by the NSW Government, rather than provide notice to customers to provide responses, the Government relied on a Metropolitan Water Independent Review Panel to provide expert input on planning matters.

#### Stakeholder Submissions

No stakeholder submissions specifically commented on GAWB's proposal to provide notice to customers.

#### The Authority's Analysis

GAWB proposes to provide customers with a notice of a *potential* augmentation, which incorporates details of the proposed response, the estimated pricing implications and which provides customers with an opportunity to respond. As proposed, the notice should be issued at the time the low supply alert is issued under the DMP (for drought). For the purposes of unexpected additional demand, notice should be given as soon as it is reasonably expected by GAWB that contractual arrangements will eventuate. In this regard, the Authority notes that there is usually sufficient time available for the necessary consultation about the appropriate nature and size of the augmentation (or other response) due to the lead times associated with constructing the new customers' plant and facilities (and associated approval processes).

The Authority notes that GAWB's particular circumstances, that is, supplying a small number of bulk water customers, permits such a consultative approach. In this regard, the approach is likely to be more practical in GAWB's circumstances than the NSW approach of using an independent panel.

The Authority concludes that the proposed nature of the notice is appropriate. Further, the Authority notes that, for the proposed response to be relevant, it is essential that the 20 year plans be updated every five years. These plans should also incorporate details of other possible supply and demand management responses (including their price and cost implications) to allow their evaluation for the circumstances prevailing at a particular point in time.

In regard to drought, consistent with the Authority's conclusions regarding the DMP (Chapter 2), the notice to customers could be widened to invite customer feedback on the timing of the trigger, taking account of the key assumptions such as the latest inflow data, supply information, and most recent demand forecasts.

## 4.4 Customer Responses

### *GAWB's Submission*

GAWB indicated that customers may respond to the notice of the potential augmentation by:

- making no change to water demands;
- examining bypass options or efficiency savings;
- trading part or all of their water reservations and applying to GAWB for a reduction; and

- submitting proposals to GAWB for funding of investments to reduce demand and therefore defer the need for augmentation. In drought circumstances, curtailment arrangements would apply in accordance with the DMP and customer contracts.

Customer responses would be required within a 30- to 60-day period, on the basis that customers will have already developed information on the technical and commercial issues. For the previously prevailing drought, GAWB indicated that commercial proposals should be lodged with GAWB by 30 March 2008 (about 60 days after pricing implications of the augmentation option are known).

#### *Other Jurisdictions*

The Waterproofing Adelaide Strategy (2005) was finalised following two rounds of consultation, the first between December 2003 and March 2004, and the second between November 2004 and January 2005. Supply and demand options were also evaluated through consultation forums and a random survey of customers.

The Victorian Government's Sustainable Water Strategy for the Central Region (2005) followed an 18-month consultation process with the community and included a discussion paper, a draft strategy, public meetings and scrutiny by independent experts.

The QWC's Draft SEQ Water Strategy (2008) is proposed to be refined after considering feedback from the community. The Draft Water Strategy was released in March 2008, with comments due by 31 July 2008, providing a period of at least four months for consultation. The QWC noted that the proposed supply and demand responses outlined in the Draft Strategy would be reviewed in the light of community input.

#### *Stakeholders' Submissions*

Stakeholder submissions in the first instance focused on the implications of the significant February inflows in delaying the need for the current drought response and therefore the proposed timing of customer responses. However, stakeholders commented adversely on the short time frames proposed under the current drought for fully costed proposals including proposed contractual arrangements.

CPM noted that it intended to submit a proposal in response to GAWB's proposed strategy for the Fitzroy Pipeline, but was challenged by the tight timeframes specified by GAWB. RTA was concerned about the limited time for customers to present demand or supply side alternatives.

#### *The Authority's Analysis*

##### (a) Timing Issues

GAWB has proposed that customers provide fully costed demand management or supply substitution options within 30 to 60 days of notice being given.

The Authority notes that, in the recent drought, GAWB provided notice of its proposed appropriate augmentation and the likely timing at the time of the low supply alert in September 2007, but proposed not to provide pricing implications until 31 January 2008, leaving little time for customers to respond to GAWB's proposed pricing implications. This situation arose in part due to the continuing drought and the timing of the current investigation.

The Authority agrees with GAWB that, under a robust and ongoing future planning process, both customers and GAWB should be aware of most of the available options thereby reducing

the time and amount of additional work needed to be undertaken by customers. Further, the more comprehensive and up to date the strategic planning, the less likely customers will identify a hitherto unknown drought responses as a result of the Low Supply Alert notice.

Further, once the process and timetable is established, customers will be aware in advance of any potential timing constraints and can either ensure that options of interest are fully examined as part of the normal planning process or commence preliminary work of options in advance of notice.

Nevertheless, the Authority notes that GAWB proposes to issue the notice for drought to be given at the Low Supply Alert. Even on GAWB's preferred 'worst three year' inflow assumption, there is twelve months before a construction trigger. For unexpected additional demand, the time available depends on the lead-time for the new customer demand, which typically should be known two to three years in advance.

The Authority therefore concurs with RTA and CPM that the timelines proposed by GAWB for the response to the notice are unnecessarily short. It is also noted that longer consultation periods have applied in other planning processes in other jurisdictions.

The Authority considers that 120 days should provide sufficient time for customers to prepare detailed responses and for GAWB to then analyse options and have up to six months lead time to undertake any necessary preparatory work and reach contractual agreement. If earlier implementation of a proposed customer option was required, the onus would be on the customer to submit proposals earlier within the 120 day period to make the option workable.

#### (b) Scope of Customer Responses

The range of possible customer responses identified by GAWB is considered to be comprehensive. However, for their implications to be assessed by both GAWB and customers, the trading framework needs to be fully developed and curtailment options clear. Needless to say, the more comprehensive the planning process is in terms of options, the more likely that the timelines will be capable of being effectively achieved.

In regard to drought, customers' responses may provide further information regarding forward demand projections and their risk attitudes regarding inflows. Consistent with the Authority's preferred more flexible DMP arrangements, customers should have the opportunity to respond not only to the proposed augmentation or other solution, but also to the assumptions underlying the trigger process.

## 4.5 Evaluation and Option Selection

### *GAWB's Submission*

GAWB proposed that it would evaluate the proposals based on pre-determined criteria and using cost benefit analysis. GAWB may then either enter into negotiated arrangements with customers to reduce their water reservation or construct the appropriate source augmentation. GAWB indicated that it would conclude this evaluation within 30 days.

GAWB requested that the Authority review GAWB's proposed criteria to assess proposals that may be submitted by customers, namely that:

- the proposal must generate reductions to water demand that GAWB is contractually obligated to meet;

- the costs of the alternative proposal must be less than the benefits of deferral to customers, expressed as the net present value (NPV) of their water costs; and
- where competing alternatives generate 'a similar quantum of benefit', a further evaluation would be undertaken to investigate the 'broader economic costs and benefits' including externalities and social impacts.

GAWB suggested that, in determining the costs and benefits, the analysis should take account of:

- the time value of deferral;
- a comparable cash flow period (20 years or longer), and including a value for 'enduring costs and benefits' beyond the cash flow period; and
- the existing 20-year demand and augmentation profile used to calculate prices.

GAWB indicated that proposals should include the commitments that the proponent is prepared to enter into, the costs to GAWB, the commencement date and amount of demand reduction, the allocation of risks between GAWB and the proponent, and arrangements for ongoing water charges. GAWB indicated that, if it was to invest \$50 million to reduce contracted demand, for example by retrofitting a power station to allow partial air-cooling, then this sum should be added to GAWB's asset base for pricing purposes.

#### *Other Jurisdictions*

The process of evaluation and option selection applied by the QWC in its Draft SEQ Water Strategy (2008) involved an initial screening of demand and supply options prior to a more detailed economic assessment of alternative portfolios of the options. The screening process focused on hydrological performance, indicative cost and social and environmental impacts.

The portfolio analysis incorporated the principles of least cost planning to compare the costs and benefits of different suites of water supply and demand initiatives.

#### *Stakeholder Submissions*

CPM submitted that GAWB's previous evaluation of future supply options/contingency strategies was not robust. Further, CPM had concerns that GAWB's proposed evaluation process may not allow for proper consideration of all possible options.

CPM stated that the evaluation process ensures that sufficient discretion remains with GAWB. For example, CPM questioned:

- what constitutes a 'similar quantum of benefit' and how much cheaper does a demand management option have to be as compared to the Fitzroy River Pipeline before it is considered superior?;
- what constitutes 'broader economic costs and benefits' and "qualitative assessments of social impacts"; and
- how GAWB intends to account for any 'enduring costs and benefits' is unclear. For example, CPM queried whether, in the case of air-cooling, GAWB would consider the future decommissioning of a power station an advantage or disadvantage.

CPM stated that, given GAWB's public and high-profile promotion of the Fitzroy River Pipeline as its preferred project, it would seem difficult for GAWB to objectively assess a competing and mutually-exclusive proposal.

CS Energy concluded that, in relation to GAWB's proposed Fitzroy River Pipeline, the need has not been demonstrated, and the alternatives have not been properly considered.

#### *The Authority's Analysis*

GAWB is a category 1 Water Authority and, under the *Water Act 2000 (s640)*, is required to be commercially successful in its business activities and efficient and effective in providing goods and services, including CSOs.

The evaluation of all options must therefore be undertaken from the perspective of these responsibilities. Accordingly, as noted by GAWB, all options, including those submitted by customers at the time notice is provided, must be evaluated on the basis of commonly accepted principles for the evaluation of commercial projects.

These would include taking into account:

- the time value of any deferral;
- ensuring a comparable cash flow period (20 years or longer), and including a value for 'enduring costs and benefits' beyond the cash flow period; and
- the existing 20-year demand and augmentation profile used to calculate prices.

In addition, other underlying assumptions include that the capital expenditures are assessed as being 'fit for the purpose' and represent the least cost approach to meeting the future supply shortfall.

In respect to the individual criteria proposed by GAWB, the Authority's comments and conclusions are as follows.

#### (a) Reductions to contractual obligations

GAWB has submitted that the proposal submitted in response to a notice must generate reductions to water demand that GAWB is contractually obligated to meet.

The Authority can envisage some situations where a proposal should be considered where it does not result in a reduction of demand contracted by GAWB to a particular party. For example, this could occur where trading of water is enabled by demand management by a particular party. Alternatively, current customers may be able to generate supplementary supplies such as through recycling or stormwater management.

Accordingly, the Authority recommends that this criterion could more appropriately be defined as requiring customers to provide any submissions which could forestall the need for augmentation in a cost-effective manner.

#### (b) Benefits of deferral must exceed costs

GAWB has proposed that the costs of the alternative proposal must be less than the benefits of deferral to customers, expressed as the net present value (NPV) of their water costs.

GAWB's proposal to consider the benefits to customers and the costs associated with a proposal would ensure the viability of an investment. Reliance upon an appropriately specified NPV analysis will ensure that the time value of money is taken into account and is a well recognised methodology for commercial decision-making.

While in the formal planning process, the full cost of each alternative needs to be taken into account, where preparatory costs are already incurred associated with any option, in this case the preferred contingent supply strategy, only the incremental costs of the augmentation option should be compared to an alternative proposal.

Further, GAWB is required to establish asset plans into the future and is well informed of possible non-commercial implications of various options. GAWB should therefore seek to identify broader economic issues of potential relevance to the appropriateness of various infrastructure options. These issues should be brought to the attention of the relevant Ministers.

Consistent with the requirements of the *Water Act 2000*, unless directed by Ministers to do otherwise, GAWB, as a category 1 water authority, must adopt that option which generates the most commercial benefit to GAWB. GAWB would need to be compensated by a CSO were an option other than that considered most commercially appropriate to be adopted.

Another implication is that GAWB's proposal for a 30-day timeline to evaluate customer proposals may well be insufficient for such an analysis and for government to determine whether it wishes for an alternate less-commercial proposal to be adopted and supported through an appropriate CSO.

Accordingly, the Authority accepts that adoption of an NPV approach would assist in the evaluation of the commercial attractiveness of alternative proposals. However, GAWB should also undertake a broader analysis of the relevant options and where a less-commercial proposal is considered most appropriate, then GAWB should proceed with it provided it receives a relevant CSO. To facilitate such a process sufficient time needs to be made available for the Government to consider the options should it wish to consider that a more non-commercial option should be adopted.

(c) Broader Economic Costs and Benefits (including externalities and social impacts)

GAWB proposes that, where competing alternatives generate 'a similar quantum of benefit', a further evaluation would be undertaken to investigate the 'broader economic costs and benefits' including externalities and social impacts.

As noted above, as GAWB is responsible for the planning of water supply within the region, GAWB must adopt a broader perspective and evaluate all options. That is, all options should be evaluated from a broader perspective not only when they generate a similar quantum of [commercial] benefit. As also noted, unless Ministers direct a less-commercial alternative and provide a CSO, then GAWB would be obliged to undertake only the most commercially attractive option.

## 4.6 Ex-Ante Approval

### *GAWB's Submission*

GAWB submitted that it may seek ex-ante (regulatory) approval of the scope of a response and/or the standard and cost of the asset, subject if necessary to a referral from the Ministers. GAWB suggested that approval would need to be provided within a 30- to 60-day timeframe, having regard to the construction trigger date set in the DMP.



GAWB requested that the Authority develop guidelines to be employed under such an approval process.

#### *Other Jurisdictions*

In NSW, IPART (2005) approved initial costs for the then proposed Sydney desalination plant, but noted that actual expenditure would be reviewed in the next review. However, the NSW Government subsequently directed Sydney Water to construct the desalination plant. And in June 2007, the NSW Government directed IPART to include the efficient costs of constructing the desalination plant when determining the maximum price for services provided by Sydney Water.

In other jurisdictions, ex-ante approval by regulators is typically limited to forecast capital expenditure over an ensuing regulatory period. In WA, the ERA (2008) considered that the Bunbury and Busselton Water Boards' forecasts for capital works were necessary and appropriate. The ICRC's 2007 draft decision for the ACTEW water and wastewater price review reduced the forecast capital expenditure on the basis that higher than would be incurred by an efficient business.

In Victoria, the ESC's Guidance Paper (2007) for the 2008 water price review indicated that the proposed capital expenditure is independently assessed by experts to ensure that forecasts are efficient and account for a planning horizon that extends beyond the 5-year regulatory period.

In SA, Essential Services Commission of South Australia (ESCOSA) (2007) noted that in the case of SA Water's capital program, little or no information was provided to demonstrate that forecast capital costs are efficient.

#### *The Authority's Analysis*

The Authority notes GAWB's request for the Authority to provide guidelines that could be employed as part of an ex-ante approval process. GAWB indicated that ex-ante approval may be sought for the scope of the response (the appropriate augmentation and trigger) and /or the efficient standard and cost of the asset.

The current pricing principles applying to GAWB already allow for a review trigger if there are sustained variations in aggregate revenues of 15% or more (QCA, 2005). Such a review could incorporate an assessment of the appropriate scale and cost of a proposed augmentation. However, as noted by GAWB, a referral from the Ministers is required for the Authority to instigate such an investigation.

The Authority's legal advice indicates that, under section 23(2)(a) of the QCA Act, the Ministers can refer GAWB for an investigation about pricing practices, including the regulatory asset base.

In such an investigation, the Authority could develop guidelines for approval of capital expenditure which, if followed by GAWB, the Authority would be likely to include in the regulatory asset base. The nature of the guidelines would be likely to depend on the degree of urgency in the situation to which GAWB is responding. In this regard, the Authority has previously developed principles in its investigations including the DBCT Draft Access Undertaking (2006) and the Draft Report *General Pricing Principles for Infrastructure Investments made in response to Extraordinary Circumstances* (2004).

However, the advice further states that it goes beyond the Authority's powers under Part 3 of the QCA Act to bind itself in terms of future consideration of GAWB's regulatory asset base.

That is, while the Authority can provide guidance, it cannot provide a binding ex ante approval of the type sought by GAWB under the current provisions of the QCA Act. Under the monopoly oversight provisions of the QCA Act, the ultimate decision on the conduct of the government monopoly business activity is left to the Ministers.

Recent amendments to the QCA Act do not provide any additional scope for the Authority to provide a binding ex-ante approval for GAWB.

In summary, the Authority concludes that:

- the previously approved review trigger arrangements may apply where the investment results in an increase in aggregate revenue greater than 15%. However, a Ministerial Direction would be required to allow the Authority to proceed with such a review; and
- guidelines have been provided in some of the Authority's previous reviews. However, the Authority cannot give a binding ex-ante guidelines under part 3 of the QCA Act.

#### **4.7 Construction Trigger**

##### *GAWB's Submission*

As the final part of the process, GAWB submitted that it will commence construction upon the relevant trigger event, subject to its board and other approvals. GAWB also stated that it will be responsible for demonstrating that it has complied with the trigger points outlined in this process.

In the recent drought, construction was expected to be triggered in October 2008, or 13 months after the issue of the low supply alert. However, GAWB submitted that the trigger point may be deferred if:

- demand reductions, voluntary or mandated as curtailment arrangements are achieved; or
- acceptable alternative proposals are submitted by customers, such as a reduction in demand facilitated by retrofitting power stations to facilitate partial air cooling.

##### *Other Jurisdictions*

The NSW Government's Metropolitan Water Plan (2006) indicated that the desalination plant construction would commence when existing supplies reach 30%. However, under its adaptive management approach, the NSW Government has since proceeded to commence construction of the desalination plant even though reserves are higher than 30%.

The QWC's Draft SEQ Water Strategy (2008) identifies the range of current projects being implemented to meet the region's needs until 2028. It indicates that further sources will be required between 2028 and 2042, unless brought forward as a response to severe drought. The Strategy is intended to provide an adaptive management framework to prevent supply gaps developing.

Other Plans such as Waterproofing Adelaide (2005) and the Victorian Government's Central Region Sustainable Water Strategy (2005) identify a range of responses to prevailing drought and increasing demand without any specific detail in relation to construction triggers.

### *Stakeholder Submissions*

Stakeholder submissions did not specifically comment on processes related to the construction trigger itself.

### *The Authority's Analysis*

GAWB has proposed that it is responsible for demonstrating it has complied with the process leading up to the trigger point and that, subject to Board and other approvals, it would then initiate construction.

The Authority agrees it is GAWB's responsibility to demonstrate compliance with the process.

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