

Halcrow Pacific Pty Ltd

April 2008



**Independent Competition and
Regulatory Commission**

Review of Capital and Operating Expenditure
associated with ACT Water Security Measures

Review Report

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Independent Competition and Regulatory Commission

Review of Capital and Operating Expenditure associated with ACT Water Security Measures

Review Report

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Contents

1	Introduction	1
1.1	<i>General</i>	1
1.2	<i>Scope of Review</i>	1
1.3	<i>Review Process</i>	2
2	Water Security Program	5
2.1	<i>Introduction</i>	5
2.2	<i>Development of Water Security Program</i>	6
2.2.1	Overview	6
2.2.2	Think Water/Act Water Strategy (April 2004)	6
2.2.3	Future Water Options (2004/2005)	7
2.2.4	Review of Future Water Options Assumptions (June 2006)	9
2.2.5	Water2Water Proposal	9
2.2.6	Future Water Options Review (July 2007)	9
2.2.7	Water Security Recommendations (July 2007)	10
2.2.8	Water Security Taskforce Response (September 2007)	11
2.2.9	Summary of Water Security Program Options Development	12
2.3	<i>Prudence and Efficiency of the Planning Process</i>	12
3	Proposed Water Security Measures	15
3.1	<i>Introduction</i>	15
3.2	<i>Enlargement of Cotter Dam</i>	15
3.2.1	Overview	15
3.2.2	Project Scope	15
3.2.3	Project Justification/Option Selection	16
3.2.4	Estimated Cost	17
3.2.5	Program	17
3.3	<i>Murrumbidgee to Googong Transfer</i>	18
3.3.1	Overview	18
3.3.2	Project Scope	18
3.3.3	Project Justification/Option Selection	19
3.3.4	Estimated Cost	20
3.3.5	Program	20
3.4	<i>Demonstration Water Purification Plant</i>	21
3.4.1	Overview	21
3.4.2	Project Scope	21
3.4.3	Project Justification/Option Selection	22
3.4.4	Estimated Cost	24
3.4.5	Program	24

3.5	<i>Smart Metering</i>	25
3.5.1	Overview	25
3.5.2	Project Scope	25
3.5.3	Project Justification	25
3.5.4	Estimated Cost	27
3.5.5	Program	27
4	Review of Proposed Capital Expenditure	29
4.1	<i>Overview</i>	29
4.2	<i>Enlargement of Cotter Dam</i>	30
4.3	<i>Murrumbidgee to Googong Transfer</i>	31
4.4	<i>Demonstration Water Purification Plant</i>	35
4.5	<i>Smart Metering</i>	36
4.6	<i>Updated Estimates – Capital Expenditure</i>	37
5	Review of Proposed Operating Expenditure	38
5.1	<i>Overview</i>	38
5.2	<i>Enlargement of Cotter Dam</i>	39
5.3	<i>Murrumbidgee to Googong Transfer</i>	39
5.4	<i>Demonstration Water Purification Plant</i>	40
5.5	<i>Smart Metering</i>	40
5.6	<i>Updated Estimates – Operating Expenditure</i>	40
6	Capital Program Delivery	42
6.1	<i>Overview</i>	42
6.2	<i>Proposed Delivery Mechanisms</i>	43
6.3	<i>Assessment of Delivery Capacity</i>	44
7	Conclusions	46
8	Recommendations	49
9	References	52

1 Introduction

1.1 *General*

Halcrow was commissioned by the Independent Competition and Regulatory Commission (the Commission) to undertake a review of proposed capital and operating expenditure associated with the implementation of a number of water security measures to service consumers in the Australian Capital Territory (ACT).

The Commission is responsible for determining the tariffs that ACTEW Corporation (ACTEW) can apply for the provision of water and wastewater services in the ACT. In order to determine the applicable tariffs, the Commission undertakes a comprehensive enquiry into ACTEW's business, including the expenditure it expects to incur in providing the services, on a regular basis.

The Commission is currently undertaking such a review with a view to setting tariff levels for the period 1 July 2008 to 30 June 2013. The outcomes of this review of expenditure associated with the proposed water security measures will be used as an input to the tariff setting process.

1.2 *Scope of Review*

The primary objectives of the assignment were to assess, in respect to capital and operating expenditure associated with the water security measures announced by the Chief Minister of the ACT on 23 October 2007:

- the prudence and efficiency of the proposed capital expenditure for the water security program (to the extent that there is sufficient information);
- the efficiency of the estimated operating expenditure for the water security program (to the extent that there is sufficient information); and
- to establish and apply a reasonableness test where sufficient information is not available to test prudence or efficiency.

The water security measures assessed as part of this review have included:

- increasing the size of Cotter Dam;
- installation of infrastructure to transfer water from the Murrumbidgee River to Googong Dam;
- trial of a Smart Metering System; and
- design of a Demonstration Water Treatment Plant.

In undertaking the review, consideration was given to the following:

- the ICRC Act 1997 (ACT) and the Utilities Act 2000 (ACT);
- the ACT Treasurer's industry reference to the Commission to investigate water and waste water services;
- current and projected system capacity;
- appropriate asset utilisation levels benchmarked against best practice;
- current demand and likely future demand (as measured by customer numbers and water sales);
- current condition of assets and renewal requirements;
- existing operational requirements;
- opportunities for demand management;
- current safety and planning standards accepted by the industry;
- customer service standards;
- social requirements; and
- environmental requirements.

1.3

Review Process

The process adopted for this review of proposed expenditure has involved the following steps:

- *Inception Meeting with the Commission:*
An initial meeting was held with the Senior Commissioner and members of the Secretariat. The scope of the review was discussed including specific issues identified for consideration by the Commission.
- *Initial Meeting with ACTEW:*
An initial meeting was held with representatives of ACTEW/ActewAGL and the Commission Secretariat. This primarily involved the ACTEW/ActewAGL representatives providing an overview of the Water Security Program.

ACTEW/ActewAGL subsequently provided digital copies of reports related to the Water Security Program.
- *Collection and Review of Information:*
Available information relevant to both the Water and Wastewater Price Review and the Water Security Program was collected and reviewed. This included:
 - the reports related to the Water Security Program provided by ACTEW/ActewAGL;
 - reports related to the Water Security Program available from the ACTEW website;

- reports related to the Water Security Program available from the ThinkWater website; and
- reports related to the Water and Wastewater Price Review available from the Commission website.
- *Detailed Interviews/Discussions with ACTEW:*

Detailed discussions were held with representatives of ACTEW/ActewAGL over several sessions which were arranged to suit the availability of the relevant personnel. These discussions were arranged generally as follows:

 - Overview of the Water Security Program including details of the process undertaken to identify the proposed works and an outline of how the individual components of work integrate with the existing water supply system from both a physical and operational viewpoint.
 - Detailed discussions focussing on each of the water security measures being reviewed. In each case, these discussions addressed the scope of the works, the basis for the estimates of associated costs, the proposed delivery mechanisms, the implementation program for the works and issues that may impact on project delivery.

A number of items of additional information were provided by ACTEW in response to requests made during the detailed discussions.

- *Review of Proposed Expenditure:*

A detailed review of the information collected prior to, during and subsequent to the detailed discussions with ACTEW's representatives was undertaken to assess, to the extent possible, the prudence and efficiency of the proposed capital investment and the efficiency of the proposed operating expenditure associated with each of the proposed water security measures. The assessment comprised a review of the following:

 - the planning process through which the proposed water security measures were identified for further development/implementation;
 - the proposed capital expenditure;
 - the proposed operating expenditure; and
 - the ability to deliver the proposed water security measures (in addition to the previously identified capital program).
- *Preparation of Draft Review Report:*

The process and findings of the review undertaken by Halcrow were documented in a (Draft) Review Report, together with recommendations in respect to the prudence and efficiency of the proposed expenditure.

- *Presentation/Discussion of Findings:*

The review findings were presented and discussed at meetings with the Senior Commissioner and members of the Secretariat, and representatives of ACTEW.

Some additional information was provided by ACTEW both at, and subsequent to, the meeting in response to the findings presented in the Draft Review Report.

- *Finalisation of Review Report:*

The Review Report (this report) was finalised, taking into account comments arising from the presentation discussions and review by the Commission and ACTEW.

2 Water Security Program

2.1 *Introduction*

On 23 October 2007, the Chief Minister and Minister for the Environment, Water and Climate Change, Jon Stanhope, announced a range of water security measures to be implemented in order to secure the ACT's water supply. These measures include:

- enlarging the Cotter Dam from 4 gegalitres (GL) to 78 GL, with planning and design work to begin immediately and work expected to be completed within three to five years (at a capital cost of about \$145 million);
- the installation of infrastructure to increase the volume of water transferred from the Murrumbidgee River to the Googong Dam (about \$70 million¹);
- pursuing the possibility of purchasing water from Tantangara Dam (about \$38 million);
- design of a demonstration Water Purification Plant, with the water produced during demonstration to be used for purposes other than drinking (about \$6 million will be spent during the year-long design phase);
- increasing funding for demand reduction measures by \$2 million;
- investigating the extension of Permanent Water Conservation Measures;
- implementing a pilot Smart Metering program; and
- voluntarily off-setting the additional greenhouse gases generated by these projects.

Of these measures, those that will incur capital (and subsequent operating expenditure) within the 5 year price period 1 July 2008 to 30 June 2013 are the subject of this review; ie:

- increasing the size of Cotter Dam;
- installation of infrastructure to transfer water from the Murrumbidgee River to Googong Dam;
- trial of a Smart Metering System; and
- design of a Demonstration Water Purification Plant².

¹ Subsequent information indicates that the estimated capital cost of the Murrumbidgee to Googong Transfer is now about \$105 million.

² There are no operating costs associated with the design of the Demonstration Water Purification Plant.

2.2 *Development of Water Security Program*

2.2.1 *Overview*

ACTEW have undertaken an extensive body of work spanning several years to develop the program of water security measures that has now been identified for implementation. The development process has been undertaken in a number of stages, including:

- Think Water/Act Water Strategy (April 2004);
- Future Water Options Process (2004/2005);
- Review of Future Water Options Assumptions (2006);
- Water2Water Proposal (January 2007);
- Future Water Options Review (July 2007);
- Water Security Recommendations (July 2007); and
- Water Security Taskforce Response (September 2007).

A brief overview of each of these stages of the program development is provided in the following sections, primarily with a view to assessing the robustness of the development process.

2.2.2 *Think Water/Act Water Strategy (April 2004)*

In April 2004, the ACT Government released *Think Water/Act Water* – a strategy for sustainable water resources management. This global strategy defined actions to achieve sustainable water use in the ACT to the year 2050. In particular, the strategy identified actions to:

- increase the efficiency of water use through the implementation of a demand management program (with specific targets set); and
- ensure that the ACT Region has a long-term reliable source of water.

Identified water efficiency targets included:

- a 12% reduction in total demand by 2013 and 25% by 2023; and
- an increase in the use of reclaimed water from 5% to 20% by 2013.

Supply augmentation options were identified in the report *Options for the next ACT Water Source*, prepared by ActewAGL for ACTEW Corporation, April 2004 (ACTEW 2004a). Following an initial assessment of some thirty options and more detailed assessment of eleven short listed options, the following three were identified for further investigation:

- building a new dam near Mount Tennent;
- enlarging the existing Cotter Dam; and
- transferring water from Tantangara Dam (in NSW) to the Cotter catchment.

Other options considered, but not short listed for further consideration at that stage, include:

- water farm (advanced water reclamation plant at the Lower Molonglo Water Quality Control Centre);
- cross border supplies (other than the Tantangara to Cotter option);
- groundwater;
- stormwater reuse;
- enlargement of the existing Corrin, Bendora or Googong Dams; and
- construction of new dams at various alternative locations.

The three options identified for further investigation were then considered in detail as part of the *Future Water Options* process.

2.2.3

Future Water Options (2004/2005)

The *Future Water Options* process involved a review of the need and required timing for augmentation of the ACT water supply. This was followed by a detailed assessment of the options identified under the *Think Water/Act Water* strategy for provision of a long-term reliable source of water for the ACT Region.

The review of the need and required timing for augmentation of the ACT water supply was documented in the report *An Assessment of the Need to Increase the ACT's Water Storage*, prepared by ACTEW Corporation, December 2004 (ACTEW 2004b). The report identified assumptions in respect to six key factors that will impact on future water requirements, including the following:

- new population growth scenarios (around 500,000 by 2050 – upper bound estimate);
- the impact of the 2003 bushfires on catchment yields;
- revised environmental flow objectives;
- the impact of water restrictions (which had not previously been experienced in the ACT), in particular acceptable levels for the frequency, duration and severity of restrictions during periods of drought;
- the impact of climate variability and climate change (CSIRO worst case prediction of 30% reduction in inflow by 2025 was adopted); and
- demand reduction targets (as set under the *Think Water/Act Water* strategy).

Detailed assessment of the three primary long-term water source options identified under the *Think Water/Act Water* strategy is documented in the report *Future Water Options for the ACT Region- Implementation Plan: A Recommended Strategy to Increase the ACT's Water Supply*, prepared by ACTEW Corporation, April 2005 (ACTEW 2005a). The report assessed a total of twenty five variations based around the three identified options, and recommended the following:

- that implementation of the option to pump water from the Murrumbidgee River near Angle Crossing to Googong Reservoir commence immediately. (This option was identified during the assessment process as the Virtual Tennent Option. This option effectively secures the yield associated with the Tennent Dam option without the need to build a new dam);
- that:
 - the remaining options of an enlarged Cotter Dam (78GL), a small (43GL) or a large (159GL) Tennent Dam and transferring water from Tantangara Dam down the Murrumbidgee River into the ACT be retained as future viable options; and
 - ACTEW be ready to implement one of these options without delay, if required, through the development of a work program, implementation of formal processes for regularly reviewing the six assumptions, and completing analysis, design and other relevant technical studies for an approval process; and
- that additional technical analysis be undertaken for each of the dam options, including refining the dam design, further detailed examination of pipeline routes and additional examination of the benefits of building a new water treatment plant near the Tennent Dam versus transferring water from the Tennent Dam into the Mt Stromlo Water Treatment Plant.

Concurrent to the *Future Water Options* investigations for long-term water security, work was also undertaken to implement works aimed at securing water supply in the short term (primarily in response to bushfire and drought). These included:

- construction of the Mt Stromlo Water Treatment Plant to adequately treat water harvested in the Cotter catchment following the 2003 bushfires;
- optimisation of use of “current water”. Water, which would previously be spilled from Bendora Reservoir, was transferred via the Mt Stromlo Water Treatment Plant and the distribution system to Googong Reservoir (the so-called Stromlo to Googong Reticulation Transfer);
- with the construction of the Mt Stromlo Water Treatment Plant, it was possible to re-introduce the Cotter Reservoir to service. (Relatively poor water quality in the Cotter Reservoir, coupled with lack of adequate treatment facilities at Mt Stromlo, had made it difficult to use water from the Cotter Reservoir for several decades). The Cotter Pumping Station has been upgraded to transfer flows directly to Mt Stromlo Water Treatment Plant (which facilitated the so called Cotter to Googong Bulk Transfer system);
- extraction of water from the Murrumbidgee River. This led to arrangement comprising extraction from downstream of Cotter Reservoir and pumping, via the Cotter Pumping Station, to the Mt Stromlo WTP where UV treatment was added to the treatment process to facilitate the removal of pathogens.

2.2.4

Review of Future Water Options Assumptions (June 2006)

A review of the assumptions made in respect to planning variables and demand assessments in the *Future Water Options* process was undertaken and reported in *2006 Annual Review of Planning Variables for Water Supply and Demand Assessment*, prepared by ActewAGL for ACTEW Corporation, June 2006 (ACTEW 2006). The primary findings were that:

- the assumptions with respect to climate change and variability; and bushfire impacts, had not changed over the last twelve months in such a way as to change the judgements made in *Future Water Options* and subsequent advice;
- minor changes had been identified for trends in water demand reduction targets and population projections and with the new 2006 environmental flow guidelines; and
- further work was identified and initiated with respect to reviewing system performance criteria (time in restrictions), particularly in response to new Permanent Water Conservation Measures.

2.2.5

Water2Water Proposal

In January 2007, the Board of ACTEW Corporation committed in principle to enlarging the Lower Cotter Dam to increase its storage capacity from 4GL to 78GL.

The Board also committed in principle to the further purification of water discharged from the Lower Molonglo Water Quality Control Centre (LMWQCC) to drinking water standard. The purified water would be pumped to a stream in the Lower Cotter catchment from where it would flow into the Cotter Reservoir. The water would then be further treated at Mt Stromlo Water Treatment Plant before supply to consumers.

The water purification scheme would only proceed if ACTEW could provide assurance that the quality of water produced would be of a standard at least equal to, and most likely higher than, the water currently available.

Enlargement of the Cotter Reservoir and implementation of the Water Purification Scheme were identified as the *Water2Water* proposal.

2.2.6

Future Water Options Review (July 2007)

A detailed review of the *Future Water Options* program was undertaken in response to extremely low inflows to water supply storages and documented in the report *Future Water Options Review; Water Security Program*, prepared by ActewAGL for ACTEW Corporation, July 2007 (ACTEW 2007a). It is understood that this review may have been preceded by the annual review of planning assumptions

which was documented in *2007 Annual Review of Planning Variables for Water Supply and Demand Assessment (Internal Draft)*, prepared by ActewAGL (report referenced in a subsequent report, but not sighted as part of this review).

The review of the *Future Water Options* program identified some fundamental changes to the assumptions underlying the original *Future Water Options* assessment. These changes included:

- changed climate scenarios which had seen runoff decrease by more than 60% over the previous six years and by approximately 90% in 2006 (compared to the CSIRO prediction that runoff would reduce by 30%, on average, by 2030). An average of 50% reduction in long-term average reservoir inflows was adopted for subsequent assessments;
- scenario modelling based on April 2007 water storage levels (instead of assuming full storages at the start of the modelled period); and
- the *Urban Water Resource Planning Framework* published by WSAA, which recommends a combination of economic and water resource models for use in planning for future water supply security.

The review identified and assessed a total of nine individual and eight combinations of the individual options that would (potentially) form part of the water security program. The assessment resulted in a series of recommended actions (*Water Security Recommendations*) which were dependent upon a variety of climate scenarios.

2.2.7

Water Security Recommendations (July 2007)

In July 2007, ACTEW presented a series of recommendations for ensuring the long-term security of water supply to the ACT Government. These recommendations were documented in the report *Water Security for the ACT and Region; Recommendations to ACT Government*, prepared by ACTEW Corporation, July 2007 (ACTEW 2007b).

ACTEW's recommendations, which were based primarily on the observed change and variability of climate in recent years, included the following:

- immediately commence the detailed planning and construction of an enlarged Cotter Dam to 78GL capacity;
- add to the capacity and operational flexibility to extract water from the Murrumbidgee River by undertaking the work necessary to proceed to construction of a pumping capability near Angle Crossing, which could also be used to transfer additional flows released from Tantangara Dam if such flows become available; and

- obtain additional water from a source not largely dependent on rainfall within the ACT catchments through either;
 - the Tantangara transfer option; or
 - the Water Purification Scheme.

ACTEW indicated that it would advise the ACT Government on which option was preferred for the future by December 2007 after determining whether satisfactory legal and commercial arrangements can be made to transfer water to the ACT via the Tantangara Dam, including the establishment of an ACT Water Cap, and after more detailed examination of the Water Purification Scheme, especially further analysis of salt management options.

2.2.8

Water Security Taskforce Response (September 2007)

A Water Security Taskforce and Advisory Panel were engaged by the ACT Government to review the options identified in ACTEW's *Water2Water* program and their July 2007 recommendations to Government in respect to securing the ACT's water supply into the future.

The Taskforce recommended a series of actions to the ACT Government and ACTEW, as outlined in the report *Next Steps to Ensure Water Security for the ACT Region*, prepared by the Water Security Taskforce and Water Security Advisory Panel, September 2007 (ACT Government 2007). Recommended actions in respect to water supply security included:

- enlargement of the Cotter Reservoir by 2011;
- progression of (undertake design and obtain approvals) the Murrumbidgee to Googong Transfer;
- progress arrangements for the Tantangara Transfer option (ie commercial negotiations and assessment of transfer alternatives);
- not progressing the proposed Water Purification Scheme, subject to further extensive analysis (detailed design of the Water Purification Plant to be progressed, and a review of the need for additional infrastructure undertaken before a decision is made to progress to construction); and
- construction and monitoring of a Demonstration Water Purification Plant.

Actions recommended in respect to demand management included improvement of the metering of water in the ACT, with ACTEW/ActewAGL being requested to implement a pilot Smart Metering Program in the ACT, for commencement in 2008/09.

2.2.9

Summary of Water Security Program Options Development

A summary of the progress in developing the proposed Water Security Program, which has now been identified for implementation, is presented in **Table 2.1**.

2.3

Prudence and Efficiency of the Planning Process

The review of the process followed in developing the program of proposed water security measures has led to the following observations in respect to the prudence and efficiency of the process and the robustness of the resultant recommendations:

- Development of the program has resulted from an extensive process carried out over a period of at least four years.
- An extensive range of options (including variations and combinations of options) has been investigated and assessed.
- There has generally been good consistency of preferred options throughout the process, in particular the following:
 - Mt Tennent Dam (or its ‘virtual’ alternative, the Murrumbidgee to Googong Transfer);
 - Enlarged Cotter Reservoir; and
 - Tantangara Transfer.
- With the apparent exception of Water Purification Proposal, appears to have been a fairly rigorous comparative assessment of an appropriate range of options.
- The basis for the appearance of the Water Purification Plant/Scheme as a preferred option in 2007 has not been clearly explained. This option was originally identified (in principle) and assessed during development of the *Think Water/Act Water Strategy* (April 2004), however, was excluded after initial investigations on the basis of its relatively high cost, perceived health risks and likely lack of public acceptance. There was no mention of its ongoing consideration in the Future Water Options report (ACTEW 2005a) or the Annual Review of Planning Variables report (ACTEW 2006), and no documentation leading to its inclusion in the *Water2Water* Proposal adopted by the Board of ACTEW in January 2007 has been provided.

Identification of the Water Purification Plant/Scheme as a preferred option appears to be based on the desire to provide a greater diversity of water sources, including sources not reliant on rainfall with the ACT’s existing catchments.

Table 2.1 Summary of Water Security Program Options Development

Date	Action	Item	Program
April 2004	Investigate	<ul style="list-style-type: none"> ▪ Mt Tennent Dam ▪ Enlarged Cotter Reservoir ▪ Tantangara Transfer 	Think Water/Act Water
April 2005	Proceed Immediately Progress to ready state Technical Analysis	<ul style="list-style-type: none"> ▪ Murrumbidgee to Googong (Virtual Tennent Dam) ▪ Enlarged Cotter Reservoir ▪ Mt Tennent Dam ▪ Tantangara Transfer ▪ Associated infrastructure 	Future Water Options
June 2006	No change in assumptions or options		
January 2007	ACTEW Board Commitment	<ul style="list-style-type: none"> ▪ Enlarged Cotter Reservoir ▪ Water Purification Scheme (LMWQCC) 	Water2Water
July 2007	ACTEW recommendations to Government	<ul style="list-style-type: none"> ▪ Proceed with detailed planning and construction of Enlarged Cotter Reservoir ▪ Proceed (up to construction phase) with Murrumbidgee (Angle Crossing) to Googong Transfer ▪ Obtain water from a new source non-reliant on ACT catchments through either: <ul style="list-style-type: none"> - Tantangara Transfer; or - Further development of the Water Purification Scheme 	Water Security Program
September 2007	Water Security Taskforce recommendations to ACT Government and ACTEW	<ul style="list-style-type: none"> ▪ Enlarge Cotter Reservoir by 2011 ▪ Proceed (up to construction phase) with Murrumbidgee (Angle Crossing) to Googong Transfer ▪ Progress arrangements for the Tantangara Transfer option ▪ Not progress with the proposed Water Purification Plant, subject to undertaking further extensive analysis (detail design to progress with a review of the need before decision to construct) ▪ Construction and monitoring of a Demonstration Water Purification Plant ▪ Implement a Pilot Smart Metering Program in the ACT 	Water Security Program

- Whilst it is acknowledged that investigations in respect to the preferred options have continued, there appears to have been limited progress in response to recommendations made in April 2005 (the *Future Water Options Strategy*) in respect to:
 - immediate implementation of the Murrumbidgee to Googong Transfer; and
 - progression to ready state of the Cotter Reservoir Enlargement, Mt Tennent Dam and Tantangara Transfer options.

It is noted that the implementation of works aimed at securing water supply in the short term were undertaken concurrent with development of the *Future Water Options Strategy*. These projects included the Cotter to Googong Bulk Transfer and the Cotter to Stromlo Augmentation.

- Regular (annual) review of planning assumptions and assessment of the resultant impact is considered good practice. This process should not, however, restrict the ongoing implementation of adopted measures.
- It is noted that worst case climate change/variability scenarios have been considered as part of ACTEW's planning investigations. The extreme climate conditions experienced during 2006 have been modelled, however, at this stage the CSIRO 2030 worst case climate change has been adopted for planning purposes.

Given that the true impact of climate change is as yet unknown, it is considered appropriate to plan (be prepared for), but not necessarily implement for the worst case scenario. The challenge here is the identification of appropriate "trigger points", ie knowing when to act (and this may have led to the apparent delays mentioned above).

In summary, the planning process is considered to have been robust even though, in some respect, slightly protracted. The main concern is the adoption of the Water Purification Plant as a water security measure in the apparent absence of detailed justification.

3 Proposed Water Security Measures

3.1 *Introduction*

A brief outline of each of the currently proposed water security measures (which are the subject of this review) is set out in the following sections. In each case the scope of the project (as it currently stands), the justification for adopting the option, the current estimate of costs and the proposed implementation program is documented.

Current cost estimates are those presented in the report *Information Paper: Implementation of the ACT Government's announcements on Water Security*, prepared by ACTEW Corporation, 14 November 2007 (ACTEW 2007c), except where updated during discussions with ACTEW.

3.2 *Enlargement of Cotter Dam*

3.2.1 *Overview*

Details of the proposed enlargement of Cotter Dam are documented in the summary report *The Cotter Dam Option; A report assessing various alternatives for the use of Cotter Dam for future ACT water supply*, prepared by ACIL Tasman for ACTEW Corporation, April 2005 (ACTEW 2005b). This project comprises the construction of a new dam immediately downstream of the existing Cotter Dam to provide a total storage capacity of 78GL.

3.2.2 *Project Scope*

The proposed enlargement of Cotter Dam will involve the construction of a new dam approximately 150 metres downstream of the existing dam. At this stage, it is proposed that the new dam would be of roller compacted concrete (RCC) construction.

Associated works would include:

- upgrade of the site access;
- a spillway to be included as part of new dam;
- two new saddle dams (required in lower saddles of the reservoir catchment);
- a new outlet pipeline to pass under the Murrumbidgee River;
- a new pumping station; and
- provision of artificial habitat for Macquarie Perch (endangered fish species).

Maintenance/reinstatement of Cotter precinct will be required, with the scope and extent of this work yet to be determined.

The required treatment of the existing dam post commissioning of the new installation has not yet been identified, and will be in part dependent upon water quality implications. It is noted that there is a provisional heritage listing of the existing dam, which will require detailed documentation as a minimum.

3.2.3

Project Justification/Option Selection

As previously noted, relatively poor water quality coupled with lack of adequate treatment facilities had made it difficult to use water from the Cotter Reservoir for several decades. Following the construction of the Mt Stromlo Water Treatment Plant (to adequately treat water harvested in the Cotter catchment following the 2003 bushfires) it was possible to re-introduce the Cotter Reservoir to service.

The Cotter Reservoir lies on the lower reaches of the Cotter River, which has a relatively high yield catchment. With a capacity of only 4GL, the existing reservoir is not adequate to maximise harvesting potential.

Initially, four options involving the Cotter catchment were considered, including:

- existing reservoir, with increased use of environmental releases from Bendora Reservoir;
- new 45GL Cotter Dam;
- new 78GL Cotter Dam; and
- new 68GL Coree Dam located upstream of the existing Cotter Dam (only to be considered if geological assessment rendered a new Cotter Dam unfeasible).

The small (45GL) Cotter Dam option was discarded on the basis that:

- hydrological assessment indicated that it would not add sufficiently to future water yield; and
- it presents a potential fish passage threat for the Macquarie Perch population (an endangered species whose habitat lies in the Cotter River).

The large (78ML) Cotter Dam option was adopted on the basis that it maximises potential yield, whilst also achieving requirements in respect to the fish habitat. It compares favourably to other 'new dam' options in that:

- the site is Government owned;
- there is limited catchment impact, with identified impacts being primarily environmental (ie there are minimal, if any, social impacts such as resident displacement); and
- approval processes are expected to be relatively straightforward.

In respect to the potential environmental impacts, which relate primarily to the Macquarie Perch (fish) habitat, investigations are currently in hand to assess options for the provision of artificial habitat within the new reservoir. The presence of the fish currently results in the imposition of severe operational limitations (a maximum drawdown of 1.5 metres applies). The provision of artificial habitat is aimed at extending the operational range of the reservoir, although it may still be necessary to ensure that the reservoir is full at fish spawning times (ie November).

It is noted that the Cotter Dam Enlargement project has featured as a preferred supply augmentation option throughout the water security program development process.

3.2.4

Estimated Cost

The estimated cost of the Cotter Reservoir Enlargement project, as identified in the Information Paper (ACTEW 2007c), amounts to capital expenditure of \$145 million (over the period 2007/08 to 2010/11) and operating costs of \$3.0 million, ie \$1.0 million per annum (over the period 2010/11 to 2012/13).

During discussions, ACTEW indicated that a final revision of the capital cost estimate will be prepared by the Bulk Water Alliance partners (refer **Section 6.2**) once the design concept is finalised, and that they believe that the final outturn cost may be up to 30% greater than the current estimate.

3.2.5

Program

The Cotter Dam Options Report (ACTEW 2005b) indicates that a period of 20 months would be required for construction of the Cotter Dam Enlargement project, of which 16 months would be required for construction of the dam itself. The report further indicates that:

- the controlling factor would be construction of the pumping station due to the long lead-time for the supply of the pumps, motors and valves;
- if a decision was made to build in 2005 to build the enlarged dam, 2006 and 2007 would be required to undertake the required environmental impact studies, thereby allowing construction to start in mid 2008; and

- filling would take most of 2010 and 2011, with the dam being ready for use by the beginning of 2012.

The proposed cash flow presented in the Information Paper (ACTEW 2007c) indicates that construction is currently scheduled to be undertaken during the period 2008/09 to 2010/11, which is consistent with the Water Security Taskforce recommendations (ACT Government 2007) that the dam be completed by 2011. Discussions with ACTEW revealed that:

- the project is to be delivered through a Bulk Water Alliance (refer **Section 6.2**);
- the Alliance design partner has been selected and is expected to commence work in early April 2008;
- the Alliance construction contractor is expected to be engaged within the next couple of months (post March 2008);
- a detailed scope of work is to be confirmed and the cost estimate updated by late 2008; and
- environmental issues (particularly those related to the Macquarie Perch) are currently being investigated.

The environmental issues have the potential to impact on/delay project implementation.

3.3 Murrumbidgee to Googong Transfer

3.3.1 Overview

Details of the proposed Murrumbidgee (Angle Crossing) to Googong Transfer are documented in the summary report *The Tennent Dam Option; A report assessing various alternatives for a new Tennent Dam for future ACT water supply*, prepared by McCann Property and Planning for ACTEW Corporation, April 2005 (ACTEW 2005c), in which it is referred to as the Virtual Tennent Option. This proposes the construction of a weir on the Murrumbidgee River, a pumping station and a pipeline for the bulk transfer of raw water.

3.3.2 Project Scope

Whilst it is understood that the final arrangement of the infrastructure required for this project has not yet been finalised, the option currently preferred option comprises:

- a weir on the Murrumbidgee River at (or near) Angle Crossing, ie where the Murrumbidgee River crosses the southern border of the ACT;
- a pumping station to lift flows from the river, together with a high lift booster pumping station located adjacent to the river; and

- a pipeline of approximately 13km length to convey water from the Murrumbidgee River to Burra Creek at a point some 7km upstream of Googong Reservoir.

Depending upon the outcomes of environmental studies currently being undertaken, it may be necessary to extend the pipeline generally parallel to Burra Creek to the upper reaches of Googong Reservoir. ACTEW has advised that, in the event that extension of the pipeline is found to be necessary, a further comparative assessment against alternative pipeline options will be undertaken.

The proposed transfer capacity of the system is 100ML/day.

3.3.3

Project Justification/ Option Selection

The first mention of the Murrumbidgee to Googong Transfer option appears to be as the 'Virtual Tennent Option' in the Future Water Options report (ACTEW 2005a). A similar arrangement with a weir on the Gudgenby River (at the proposed site of the Tennent Dam) was identified as a staging option in the report outlining options for the ACT's next water source (ACTEW 2004a).

The Tennent area has been regarded as a potential source of water for Canberra for many years and the *Think Water/ Act Water* strategy identified the building of a new dam near Mt Tennent for further investigation and comparative assessment. A number of option variants were identified including dams of 43GL, 76GL and 159GL capacity to be constructed on the Gudgenby River downstream of the confluence with the Naas River and virtual Tennent option.

The 'Virtual Tennent Option' would involve using an agreed proportion of the Gudgenby River flow (and possibly other unused ACT river flows), but extracted at a site on the Murrumbidgee River at Angle Crossing and pumped to the Googong Reservoir. This arrangement effectively secures the yield associated with the Tennent Dam option without the need to build a new dam (and the associated financial social and environmental costs) or a new/augmented water treatment plant. Significant community disruption and modification of existing infrastructure (roads and power lines) would be required to accommodate a new reservoir.

A further potential benefit of the 'Virtual Tennent Option' is the ability to extract flows released down the Murrumbidgee River from Tantangara Reservoir if this option is found to be feasible.

The cost of a new Tennent Dam was estimated to be in the order of \$171 million to \$247 million (\$ 2005) depending upon the size of the dam and the adopted

treatment/pipeline arrangements, with the cost of infrastructure relocation in the range from \$16.9 million to \$27.7 million (\$ 2005) depending on reservoir size. By comparison, the estimated cost of the Virtual Tennent Option was approximately \$35 million for a transfer capacity of 60ML/day (yield up to 20GL per annum).

It is noted that consideration may still be given to the construction of a dam on the Gudgenby River near Mt Tennent at a later date.

3.3.4

Estimated Cost

The estimated cost of the Murrumbidgee to Googong Transfer project, as identified in the Information Paper (ACTEW 2007c), amounts to capital expenditure of \$70 million for a transfer rate of 60ML/day (over the period 2007/08 to 2009/10) and operating costs of \$8.0 million, ie \$2.0 million per annum (over the period 2009/10 to 2012/13).

During discussions, ACTEW indicated that as of January 2008, a more recent estimate of the capital cost is \$105 million on the basis that a maximum transfer capacity of 100ML/day has now been allowed for. For comparative purposes, this cost would increase to approximately \$133 million if it becomes necessary to extend the pipeline the full distance to Googong Reservoir.

ACTEW again indicated that a final revision of the capital cost estimate will be prepared by the Bulk Water Alliance partners (refer **Section 6.2**) once the design concept is finalised.

3.3.5

Program

The Tennent Dam Options Report (ACTEW 2005c) indicates that a period of 20 months would be required for construction of the Murrumbidgee to Googong Transfer (Virtual Tennent Option) project, and that the controlling factor would be construction of the pumping station(s) due to the long lead-time for the supply of the pumps, motors and valves.

The proposed cash flow presented in the Information Paper (ACTEW 2007c) indicates that construction is currently scheduled to be undertaken during the period 2008/09 to 2009/10. Discussions with ACTEW revealed that:

- a more detailed preliminary design is currently being undertaken (under a separate contract). Consideration is being given to alternative extraction locations and further definition of the pipeline route;
- the project is to be delivered through a Bulk Water Alliance (refer **Section 6.2**);
- the Alliance design partner has been selected and is expected to commence work in early April 2008;

- the Alliance construction contractor is expected to be engaged within the next couple of months (post March 2008);
- a detailed scope of work is to be confirmed and the cost estimate updated by late 2008; and
- environmental and approvals issues are currently being investigated. These have a potential to impact on/delay project implementation. ACTEW will seek to have the project assessed under the NSW Pipelines Act, which is administered by the NSW Department of Environment and Climate Change as this is expected to more readily facilitate the approvals process. To date, ACTEW have had only preliminary discussions with the NSW Department of Planning who administer planning approvals.

The environmental and planning issues have the potential to impact on/delay project implementation, particularly as much of the pipeline works will be located within NSW.

3.4

Demonstration Water Purification Plant

3.4.1

Overview

Details of the proposed Water Purification Plant are documented in the summary report *Water Purification Plant for the ACT*, prepared by ACTEW Corporation, July 2007 (ACTEW 2007f). This project involves the design and (if approved by Government) construction of a Demonstration Water Purification Plant to treat water discharged from the Lower Molonglo Water Quality Control Centre (LMWQCC) to a standard suitable for indirect potable reuse.

3.4.2

Project Scope

It is understood, from discussions with ACTEW, that the Demonstration Water Purification Plant will comprise an advanced water treatment plant having a capacity of approximately 8ML/day. At this stage, design only of the plant is to proceed whilst further extensive analysis of the proposal is undertaken.

The Water Purification Plant will draw its supply from the outlet of the LMWQCC. The preferred treatment train for the Water Purification Plant comprises a dual membrane process (membrane filtration and reverse osmosis) with advanced oxidation using ultraviolet irradiation (UV) and hydrogen peroxide. A pre-treatment denitrification facility is to be provided at the LMWQCC.

Under the proposed arrangements, both the purified water and the resultant brine by-product will be discharged to the Lower Molonglo/Murrumbidgee Rivers via the existing LMWQCC outlet. We note, however, that brine management and discharge arrangements are subjects of ongoing investigations.

In the event that construction of a demonstration plant proceeds, the purified water will not, at this stage, be used to supplement the ACT's potable water supply. Consequently, the project scope does not include infrastructure for transferring water to a discharge point upstream of Cotter Reservoir.

The intent of the current proposal is to demonstrate (through actual performance) that treating the effluent to a standard suitable for indirect potable reuse is feasible.

3.4.3

Project Justification/Option Selection

The proposal to construct a Water Purification Plant for the advanced treatment of effluent discharged from the LMWQCC, and using the purified water for potable re-use was originally identified (in principle) and assessed during development of the *Think Water/Act Water Strategy* (April 2004). It was, however, excluded after initial investigations on the basis of its relatively high cost, perceived health risks and likely lack of public acceptance.

There was no mention of further consideration of the proposal to construct a water purification plant/scheme in the Future Water Options report (ACTEW 2005a) or the Annual Review of Planning Variables report (ACTEW 2006). Implementation of a Water Purification Scheme was, however, subsequently included as one of the components of the *Water2Water* proposal adopted by the Board of ACTEW in January 2007.

Whilst the reasoning behind this recent (2007) identification of a Water Purification Scheme as a preferred option is not clearly apparent (no documentation outlining the reasons leading to its inclusion has been provided), it is understood from discussions with ACTEW that the recommendation to include the option for further consideration is based on a desire to provide a greater diversity of water sources available to the ACT. In particular, there is a strong desire to identify and secure alternative sources that are not dependent upon rainfall within the ACT's existing catchments.

Proposals considered to date have involved the construction of a plant having a capacity of 25 ML/day, 50ML/day or 75ML/day. Development of the plant could be undertaken in three stages, each comprising three trains of approximately 8ML/day capacity. The ACT Government has asked that design proceed for a demonstration plant having a capacity of 8ML/day.

Salt removal and brine management have been key aspects of the investigations undertaken to date. Current indications are that the brine can be returned to the Lower Molonglo/Murrumbidgee Rivers for plant sizes up to 25ML/day, however, alternative management arrangements would need to be adopted for plants of greater capacity.

The fact that effluent from the LMWQCC is currently discharged to the river system raises the possibility of transferring effluent further upstream for use, without further treatment, for replacement environmental flows. This would potentially allow the extraction of additional flows from the Murrumbidgee River in the lower Cotter area (although a water balance has not been checked as part of this review).

During discussions, ACTEW advised that salt levels in the effluent discharged from the LMWQCC are increasing to the extent that management of salt discharge is likely to be necessary (although timing is not yet clear). Furthermore, nitrogen levels are also getting close to discharge limits. Consequently, it is likely that further treatment of the LMWQCC effluent will be required irrespective of the proposal for indirect potable reuse.

Information presented in the report *Water Purification Plant Options Assessment Study – Volume 1*, prepared by CH2MHill for ACTEW Corporation, July 2007 (ACTEW 2007g) indicates that the average daily load TDS during the preceding year was approximately 39,500kg/day, which is much less than the permitted 60,000kg/day. There are also, however, median (500mg/L) and 90-percentile (550mg/L) limits on TDS in the LMWQCC effluent, so the discharge authorisation would need to be increased to account for higher TDS levels to be expected as a result of discharging concentrate derived from the reverse osmosis (RO) process. It is understood that the EPA has advised ACTEW that it is unlikely to authorise an increase in discharge limits.

Action to reuse effluent from the LMWQCC is to be commended, whether it be for indirect potable reuse or otherwise. Given, however, that there is an apparent need to increase the level of treatment at the LMWQCC in order to meet environmental discharge requirements, there may be an argument for costs associated with such treatment improvements to be identified as wastewater expenditure.

Furthermore, discussions with ACTEW revealed that the treatment technology proposed for the Water Purification Plant is currently being employed at various locations around the world, thereby demonstrating its suitability for the proposed advanced water treatment. The question consequently arises as to the need to construct a plant for demonstration purposes.

3.4.4

Estimated Cost

The estimated cost of designing the Demonstration Water Purification Plant, as identified in the Information Paper (ACTEW 2007c), amounts to capital expenditure of \$6 million (over the period 2007/08 to 2008/09). As neither construction nor subsequent operation of the plant is included as part of Phase 1 of the Water Security Program, allowance for the costs associated with these aspects of the project have been separately identified.

In the event that Government approval is given to proceed with the construction of the plant, further capital expenditure totalling \$100 million would be incurred (over the period 2008/09) along with and operating costs of approximately \$12.3 million (over the period 2010/11 to 2012/13).

It is understood that the ACT Government has submitted an application for 50% funding (\$50 million) of the construction cost through the Water Fund. Consequently, an allowance of only \$50 million has been identified in the proposed capital expenditure for Phase 2 of the Water Security Program (which is not being assessed in this report).

In respect to the (potential) future construction of a full scale Water Purification Plant, current estimates of cost amount to \$180 million capital cost and \$10 million per annum operating costs for a 25ML/day plant whilst the capital cost would be in the order of \$220-\$270 million capital cost and operating costs approximately \$18 million per annum for a 50ML/day plant. It is noted that these costs significantly exceed estimates (prepared during development of the *Think Water/Act Water Strategy*), which in 2004 led (in part) to this option being excluded from the shortlist for further consideration at that time.

3.4.5

Program

The proposed cash flow presented in the Information Paper (ACTEW 2007c) indicates that design of the Demonstration Water Purification Plant is currently scheduled to be undertaken during the period 2007/08 to 2008/09. Discussions with ACTEW revealed that:

- design of the facility is expected to be complete by the end of 2008;
- construction (if it proceeds) is expected to take a further 18 months;
- the project is to be delivered through an alliance arrangement (refer **Section 6.2**);
- potential Alliance design partners are currently being assessed with an appointment expected to be made in early April 2008; and
- the planning approval process is well advanced (approval is being sought in conjunction with other works to be undertaken at the site).

3.5 Smart Metering

3.5.1 Overview

Details of the proposed smart metering pilot project are documented in the report *Project MIMI (Multi-Utility Integrated Metering Infrastructure); Feasibility Business Case*, prepared by ActewAGL for ACTEW Corporation, 7 March 2008 (ACTEW 2008). This project involves the trial implementation of smart metering for residential water, electricity and (where applicable) gas services in order to assess the feasibility of full scale implementation.

3.5.2 Project Scope

The project involves the installation of smart meters in a study area comprising 1,000 residential properties (documented as 500 properties but advised in discussions with ACTEW/ActewAGL that this has been extended to 1,000 properties) to assess the feasibility of full scale implementation. Associated data transmission, storage and management/manipulation infrastructure is to be provided and assessed as part of the study.

The trial will collect metered data for water, electricity and, where applicable, gas services across the study area.

3.5.3 Project Justification

The stated primary objectives of the MIMI (smart metering) feasibility project are to:

- assess customer acceptance (or otherwise) of the concept of smart metering, particularly as it relates to managing water use behaviour;
- determine costs, savings and benefits associated with the initiative;
- identify commercial and operational (ie network performance and customer service) advantages and savings;
- trial advanced metering technology;
- identify and assess change management issues for stakeholders, particularly ActewAGL and ACTEW;
- gain experience in the implementation of smart metering technology; and
- assess the risks associated with full scale implementation.

At a higher level, the drivers for the potential implementation of smart metering were identified (in discussions with ACTEW) as:

- environmental:
 - promoting an image of sustainability;
 - leakage reduction;

- understanding of water use patterns (with the potential for reduction in demand); and
- operational efficiency:
 - system management; and
 - leakage reduction.

It was, however, noted that expectations of the program have not yet been fully defined and that this would occur during the design stage of the project.

On the basis of the information reviewed, the following comments are provided in respect to the justification of the project:

- *Allocation of costs:*

There appears to be no allocation of (or apparent intent to allocate) costs amongst the three services to be monitored under the Smart Metering trial. It is claimed that monitoring of water use would represent the most significant portion of cost, however, this has not been clearly demonstrated.

Furthermore, as one of the expected benefits of smart metering in respect to water is a reduction in water use/leakage, there may be some argument for implementation to be funded through existing demand/leakage reduction programs.

- *Potential benefits:*

Whilst it is recognised that identification of savings is one of the objectives of the trial, there appears to be an underlying assumption that smart metering will result in significant reductions in water use. At this stage, there does not appear to have been any quantification of the expected savings, which given the current incremental cost of water, would need to be significant in order to offset the cost of the project.

It has been noted that a significant factor in impacting use would be variable pricing, as occurs in the electricity industry. It is not considered that significant incentives are present under current water pricing regimes (which do not include time of use pricing, as is the case with electricity supply).

Other potential benefits identified by ACTEW relate to operational matters such as reduced customer complaints and improved response times, reduced meter reading and special read costs, and reduced outstanding debt as a result of new and improved billing processes.

At this stage, there appears to have been no assessment of the value of the benefits to be derived from the introduction of smart metering and consequently no initial assessment of the economic feasibility (ie what is the potential pay back period of the additional cost of smart metering as

compared to the cost of manual meter reading and the value of other potential benefits?). It would normally be expected that an initial assessment of the potential benefits would be made as part of the business case development.

Significant economic gains would need to be achieved to offset the cost of the project. On the basis of the information currently available, it is not apparent that there is scope for such gains will be realised.

- *Previous experience:*

It is noted that ACTEW has consulted with a number of other agencies, including water agencies, in developing the Smart Metering trial, however, it is understood that the findings of some agencies do not support the use of smart meters for water use monitoring. Such findings (based on anecdotal comment) have indicated that:

- detailed monitoring of household use does not necessarily lead to significant reduction in water use;
- expected energy use reduction in Victoria as a result of smart metering has been estimated to be of the order of 0.03% as a result of an installation cost as high as \$1.4 billion; and
- smart meters may trigger adjustments in patterns of use rather than quantity of use (evident in the power industry).

3.5.4

Estimated Cost

The estimated cost of the Smart Metering trial project, as identified in the Information Paper (ACTEW 2007c), amounts to capital expenditure of \$1.7 million and operating costs of \$3.3 million over the period 2007/08 to 2009/10. Information presented in the Business Case document (ACTEW 2008) indicates revised estimates of approximately \$6.0 million and \$1.0 million for capital expenditure and operating costs respectively.

Discussions with ACTEW revealed that the increase in the size of the study area (from 500 to 1,000 properties) will result in a further increase in the estimated costs as presented in the Business Case document (ACTEW 2008), which are based on a study area of 500 properties.

3.5.5

Program

The proposed program for the smart metering trial spans a period of 19 months. Four stages have been identified as follows:

- Stage 1 – Project design – 3 months;
- Stage 2 – Procurement and initial installation – 2 months;
- Stage 3 – Refinement and full trial implementation – 12 months;

- Stage 4 – Evaluation and review – 2 months.

The Business Case document (ACTEW 2008) indicates that Stage 1 of the trial was scheduled to commence in early March 2008, however, discussions with ACTEW reveal that internal budget approval has not yet been given and at this stage the project commencement date has not been further defined. Consequently, some deferment of the proposed expenditure will result.

4 Review of Proposed Capital Expenditure

4.1 Overview

The total capital expenditure proposed for the water security measures as outlined in the report *Information Paper: Implementation of the ACT Government's announcements on Water Security*, prepared by ACTEW Corporation, 14 November 2007 (ACTEW 2007c) is summarised in **Table 4.1**

Table 4.1 Summary of Estimated Capital Expenditure for Water Security Program (Phase 1) – 2007/08 to 2012/13 (\$'000 nominal)

\$'000 nominal	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Enlarged Cotter Dam	5,125	31,519	75,382	44,153			156,179
Murrumbidgee Extraction	1,025	44,126	29,076				74,227
Water Purification Plant demonstration - design	3,075	3,152					6,227
Smart Metering pilot	308	1,261	215				1,784
Total	9,533	80,058	104,673	44,153	0	0	238,417

By applying an annual escalation factor of 2.5%, these nominal figures can be adjusted to \$ 2006-07 values (for consistency with figures used in the draft determination report *Water and Wastewater Price Review; Draft Report and Price Determination; Report 11 of 2007*, prepared by the Independent Competition and Regulatory Commission, December 2007 (ICRC 2007). These figures, which are presented in **Table 4.2**, are then consistent with the estimated costs presented by ACTEW in other documentation and discussions.

As outlined in **Sections 3.3.4** and **3.5.4** respectively, the estimated capital expenditure associated with both the Murrumbidgee to Googong Transfer and the Smart Metering project have been updated subsequent to publication of the Information Paper (ACTEW 2007c). In the case of the Murrumbidgee to Googong Transfer, the estimated capital cost has been increased to approximately \$105 million, whilst for the Smart Metering project it has been increased to \$6.0 million (\$ 2006-07).

Table 4.2 Summary of Estimated Capital Expenditure for Water Security Program (Phase 1) – 2007/08 to 2012/13 (\$'000 2006-07)

\$'000 2006-07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Enlarged Cotter Dam	5,000	30,000	70,000	40,000			145,000
Murrumbidgee Extraction	1,000	42,000	27,000				70,000
Water Purification Plant demonstration - design	3,000	3,000					6,000
Smart Metering pilot	300	1,200	200				1,700
Total	9,300	76,200	97,200	40,000	0	0	222,700

A discussion of the assessed efficiency of these capital cost estimates is set out in the following sections.

4.2 *Enlargement of Cotter Dam*

ACTEW's current estimate of the capital cost for the enlargement of Cotter Reservoir is \$145 million (July 2007). This amount comprises:

- \$119 million for the dam and associated works;
- \$2 million for pipelines;
- \$4 million for clearing and site preparation;
- \$15 million for the pumping station infrastructure; and
- \$5 million for miscellaneous works.

A review of the process involved in developing the most recent cost estimate indicates that a robust process has been followed. This process has comprised:

- an original cost estimate of \$102.6 million (\$ 2012) [approximately \$88.5 million (\$ 2006-07)], was prepared during the assessment of options for the next ACT Water Source as part of the development of the *Think Water/Act Water* strategy;
- a detailed cost estimate of \$98.0 million (\$ nominal) for the dam only was prepared by a consultant in 2005 as part of the *Future Water Options* process. ACTEW included allowances totalling \$21 million for related works (clearing/site preparation, pipelines, and pumping station) to give a total project cost of approximately \$120 million;
- a detailed review of the 2005 cost estimate for construction of the dam was undertaken by both the original consultant and an independent consultant in July 2007. The update by the original consultant included a review of item

cost rates, particularly those that impacted heavily on the total cost. The independent review addressed both rates and estimate inclusions; and

- the estimates prepared by the two consultants were assessed by ACTEW in July 2007 (refer report *Enlarged Cotter Dam; Update Report*, prepared by ACTEW Corporation, July 2007 (ACTEW 2007d)) and an estimated dam construction cost of \$119 million was adopted. ACTEW included allowances totalling \$26 million for related works (clearing/site preparation, pipelines, pumping station infrastructure and miscellaneous works to give the latest estimate of \$145 million (\$ 2006-07).

Analysis of the dam construction estimate reveals that it includes a contingency allowance of approximately 20% (approximately 28% if the allowance for un-estimated items is included as part of the contingency allowance). This is considered to be a suitable allowance at this stage of project development.

Details of the cost estimates prepared for the associated works, ie clearing/site preparation, pipelines, pumping station infrastructure and miscellaneous works, have not been provided or reviewed.

As noted in **Section 3.2.4**, ACTEW has indicated that a final revision of the capital cost estimate will not be prepared until the design concept is finalised by the Bulk Water Alliance partners. This is expected to be in late 2008/early 2009.

On the basis of the of the documentation reviewed, the process adopted to determine the latest capital cost estimate for the enlargement of Cotter Dam is considered to be robust and there can be reasonable confidence that (at this stage) it allows for the efficient implementation of this project.

4.3

Murrumbidgee to Googong Transfer

During discussions, ACTEW have advised that the most recent estimate of the capital cost associated with the Murrumbidgee (Angle Crossing) to Googong Transfer is \$105 million (\$ 2006-07) for a system having a maximum transfer capacity of 100ML/day. This compares to the estimated cost of \$70 million as reported in the Information Paper (ACTEW 2007c), which it appears corresponds to a maximum transfer capacity of 60ML/day.

The manner in which the most recent estimate (\$105 million) has been derived is not apparent. Detailed cost estimates prepared by a consultant as part of the *Future Water Options* process in 2005 were as follows:

- Angle Crossing Weir to Burra Creek (60ML/day) \$35 million;
- Angle Crossing Weir to Burra Creek (180ML/day) \$70 million; and
- Angle Crossing Weir to Googong Dam (180ML/day) \$90 million.

These estimates included costs for the weir, site clearing, services relocation and power supply, pipelines, pumping stations and a mini hydro facility. A contingency allowance in the order of 20% was included for each component. These estimates are considered to be robust.

The report *Angle Crossing Option; Project Plan*, prepared by Atech Group for ACTEW Corporation, July 2007 (ACTEW 2007e) indicated that a minimum escalation factor of 25% should be assumed to reflect the cost in \$ 2007. Nonetheless, the report proposed a most likely capital cost estimate of approximately \$70 million ($\pm 30\%$), which is assumed to be for a system having a maximum capacity of 60ML/day transferring to Burra Creek and corresponds to the cost estimate presented in the Information Paper (ACTEW 2007c).

It is noted that the estimate of \$70 million represents an increase of 100% from 2005 to 2007 which is considered excessive.

For comparative purposes, a summary of the capital cost estimates adopted for the Murrumbidgee to Googong Transfer is presented in **Table 4.3**.

Table 4.3 Capital Cost Estimates – Murrumbidgee to Googong Transfer (based on pumping from Angle Crossing to Burra Creek)

Date	Transfer Capacity	Estimated Cost	Comment
2004-05	60ML/day	\$35 million	Original estimate
2006-07	60ML/day	\$70 million	100% increase over 2 years ⇒ considered excessive
2007-08	100ML/day	\$105 million	50% increase in cost for 67% increase in capacity

Reference to the report *Construction Cost Outlook Report; Report for ACTEW Corporation*, prepared by BIS Schrapnel, February 2008 (BIS Schrapnel 2008) reveals that escalation of water and sewerage construction costs was approximately 5% per annum over the period 2005 to 2007. Applying these factors to the 2005 estimate of \$35 million results in an updated 2007 estimate of \$38.9 million, say \$40 million (\$ 2006-07). If a 50% increase in cost is then applied to reflect the greater system capacity, this results in a revised estimate for the 100ML/day system

of \$60 million. This amount would increase if extension of the discharge pipeline is found to be necessary.

In the absence of information to justify otherwise, a capital cost allowance of \$60 million (\$ 2006-07) would appear more appropriate for the Murrumbidgee to Googong Transfer.

Additional information provided by ACTEW in response to the Draft Review Report includes additional breakdown of the current \$105 million (nominal) estimate, although there remain inconsistencies in the actual costs presented as a result of the ongoing development of this project. The draft report *Murrumbidgee to Googong Water Transfer Preliminary Design Study, Pipeline Corridor Selection Report*, being prepared by ActewAGL, March 2008 (ActewAGL 2008b) indicates the estimated cost to be \$103.83 million for the Scheme S3A option and \$105.77 million for the Scheme S4 option. The draft report *Report for Murrumbidgee to Googong Raw Water Transfer Project, Preliminary Engineering Design Requirements*, being prepared by GHD, March 2008 (GHD 2008) indicates the estimated cost to be \$98.95 million (excluding GST) for the Scheme S3AB option.

In order to provide further assessment of the estimated capital cost of the project, the analysis presented in **Table 4.4** is provided to provide a comparison between the previously assessed 2005 based estimate and the current (latest) estimate. For the purposes of the assessment, figures from the GHD Report (GHD 2008) are adopted in view of the greater detail provided.

Comments derived from this assessment (and a review of the more detailed information) include the following:

- There was no specific allowance included in the 2005 based estimate for some line items identified in the latest estimate. These include specific allowances for project mobilisation; outlet works; testing and commissioning; and land, legal and monitoring costs.
- The allowances for pipeline and pumping station construction are of similar orders in both estimates (slightly less in the latest estimate).
- There is a substantially increased allowance for the power supply in the latest estimate, which is considered more appropriate given the extent of the work involved.
- The latest estimate includes a contingency allowance of 25%, which is considered appropriate at this stage of project development. The 2005 based estimate appeared to include a contingency allowance in the order of 20%.

Table 4.4 Assessment of Capital Cost Estimates – Murrumbidgee to Googong Transfer

Component	Halcrow Estimate Based on 2005 (<i>Future Water Options</i>) Estimates			Based on GHD 2008 Estimates	
	60ML/day Scheme (\$'000 2005)	Escalated value (\$'000 2006-07)	Upsized to 100ML/day (\$'000 2006-07)	100ML/day (\$'000 2008)	De-escalated to (\$'000 2006-07)
Dam/Weir	3,200	3,528	5,292	941	918
Services Relocation/Power Supply	1,400	1,544	2,315	12,750	12,439
Pipelines	22,100	24,365	36,548	33,200	32,390
Pumping Stations	9,100	10,033	15,049	10,859	10,594
Mini-hydro	600	662	992	-	-
Outlet Works	*	*	*	100	98
Testing and Commissioning	*	*	*	300	293
Project Mobilisation	*	*	*	10,467	10,212
Sub-total	-	-	-	68,617	66,943
Associated Costs (Land, legal, monitoring)	*	*	*	575	561
Sub-total	-	-	-	69,192	67,504
Contingencies (@ 25%)	#	#	#	17,298	16,876
Engineering surveys and Design (@ 15%)	#	#	#	10,379	10,126
Project and Construction Management (@ 3%)	#	#	#	2,076	2,025
Total	36,400	40,131	60,197	98,945	96,532

Note:

* indicates no specific allowance included

indicates that some allowance for contingencies, design and management included, but not detailed in this table.

- Allowances of 15% for engineering surveys and design and 3% for project and construction management, as included in the latest estimate are of an appropriate order.
- There is no allowance for a small mini-hydro facility in the latest estimate (minimal allowance was included in the 2005 based estimate).
- The latest estimate adjusts to an estimated capital cost of approximately \$96.5 million (\$ 2006-07).

It is noted that the escalation allowances used in the derivation of figures presented in **Table 4.4** were based on information presented in the Construction Cost Outlook Report (BIS Schrapnel 2008) which indicated that actual escalation of water and sewerage construction costs was approximately 5% per annum over the period 2005 to 2007 and expected to continue at that rate in the immediate future.

Adjustment of the capital cost estimates presented in the Pipeline Corridor Selection Report (ActewAGL 2008b) for escalation allowances results of an estimated cost in the order of \$91.5 million (\$75 million [January 2008] + 25% contingency = \$93.75 million [January 2008] = \$91.5 million [2006-07]). This is roughly consistent with the figure derived from the estimate presented in the GHD Report (GHD 2008).

The latest estimate of the capital cost of constructing the Murrumbidgee to Googong Transfer has been based on a more detailed estimate of the proposed works which are now better (although not completely) defined. A review of a sample of the rates used in developing the estimate indicates that the costs are of an appropriate order of magnitude. Consequently, the latest estimate can be considered robust.

On the basis of the information currently available, a capital cost allowance of \$96.5 million (\$ 2006-07) would appear appropriate for the Murrumbidgee to Googong Transfer.

4.4

Demonstration Water Purification Plant

The estimated design cost for the Demonstration Water Purification Plant, as indicated in the Information Paper (ACTEW 2007c), is \$6.0 million. No details of the derivation of this estimate have been provided.

The estimated design cost does, however, amount to approximately 6% of ACTEW's estimate of the construction cost (\$105 million), which is considered reasonable for work of this nature. Furthermore, during discussions ACTEW

indicated that a design cost of \$6 million is in line with estimates provided by prospective alliance design partners as part of their submissions.

It is noted that the estimated cost excludes any allowance for design of a purified water transfer system (to Cotter Reservoir or otherwise).

On the basis of the information presented, the estimated design cost for the Demonstration Water Purification Plant is considered to be efficient.

4.5 *Smart Metering*

As noted in **Section 3.5.4**, the latest estimate indicates that capital expenditure of approximately \$6.0 million (a significant increase from the previous estimate of \$1.7 million, although there has also been a reallocation of some forecast costs from operating to capital). As also noted in **Section 3.5.4**, there will be a further increase in cost to reflect the larger trial area.

A breakdown of the estimated capital cost has been provided by ACTEW. Whilst a detailed review of this breakdown has not been undertaken, it appears to cover the key project items as outlined in the Business Case document (ACTEW 2008). Items of note in respect to the estimate breakdown include:

- the capital cost estimates appear to include a contingency allowance of approximately 12.5%, which is considered relatively low given the stage of project development;
- it appears that the proportion of items to be capitalised/expensed has not yet been finalised; and
- it appears that a significant portion of the costs may be eligible for research and development rebates.

As discussed in **Section 3.5.3**, there should be a transparent allocation of a proportion of the total trial program costs to other participating services, ie electricity and gas. It is difficult to suggest a suitable allocation in the absence of relevant information, however, it is noted that ACTEW have suggested (in discussions) that a significant proportion of the cost is attributable to water. An allocation of 70% to water and 30% to electricity has subsequently been proposed by ACTEW in response to the indicative allocation of 40% water, 40% electricity and 20% gas suggested in the Draft Review Report. No detailed breakdown of costs has, however, been provided to enable assessment.

4.6 Updated Estimates – Capital Expenditure

Updated estimates of capital expenditure were provided by ACTEW just prior to the completion of this report (refer *ACT Water Demand Projections 2008/09 – 2012/2013: Updated March 2008*, prepared by ActewAGL, March 2008 (ActewAGL 2008a)). These figures, which are presented in **Table 4.5**, are assumed to be \$ nominal in the absence of any indication otherwise.

Table 4.5 Updated Estimate of Capital Expenditure for Water Security Program (Phase 1) – 2007/08 to 2012/13 (\$'000 nominal)

\$'000 nominal	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Enlarged Cotter Dam		21,200	87,400	45,000			153,660
Murrumbidgee Extraction		55,280	54,150				109,430
Water Purification Plant demonstration - design	3,800	6,200					10,000
Smart Metering pilot		1,300	200				1,500
Total	3,800	84,000	141,770	45,020	0	0	274,580

Note: amounts shown assumed to be \$'000 nominal

Points to be noted from these updated estimates are as follows:

- it appears that the estimated cost for the design of the Demonstration Water Purification Plant has been increased from \$6 million to \$10 million (nominal terms);
- the cost of the Smart Metering pilot project remains at approximately \$1.5 million; and
- with the exception of the design of the Demonstration Water Purification Plant, all expenditure on the Water Security Program projects appears to have been deferred to commence in 2008/09, whereas expenditure on all items had previously been forecast to commence in 2007/08.

The inferred deferment of project commencement (where applicable) is considered to be appropriate, however, it is noted that completion timing has not moved. This will result in a further increase in the levels of capital expenditure in the years 2008/09 to 2010/11, and particularly in 2009/10.

The apparent increase in the estimated design cost for the Demonstration Water Treatment Plant (from \$6.0 million to \$10 million) is deemed, in the absence of any explanation, to be unjustified.

5 Review of Proposed Operating Expenditure

5.1 Overview

The operating expenditure proposed for the water security measures as outlined in the report *Information Paper: Implementation of the ACT Government's announcements on Water Security*, prepared by ACTEW Corporation, 14 November 2007 (ACTEW 2007c) is summarised in **Table 4.1**

Table 5.1 Summary of Estimated Operating Expenditure for Water Security Program (Phase 1) – 2007/08 to 2012/13 (\$'000 nominal)

\$'000 nominal	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Enlarged Cotter Dam				1,104	1,131	1,160	3,395
Murrumbidgee Extraction			2,154	2,208	2,263	2,319	8,944
Water Purification Plant demonstration - design							0
Smart Metering pilot	718	2,416	323				3,457
Total	718	2,416	2,477	3,312	3,394	3,479	15,796

Again, by applying an annual escalation factor of 2.5%, these nominal figures can be adjusted to 2006-07 values (for consistency with figures used in the draft determination report (ICRC 2007). The resulting figures are presented in **Table 5.2**.

Table 5.2 Summary of Estimated Operating Expenditure for Water Security Program (Phase 1) – 2007/08 to 2012/13 (\$'000 2006-07)

\$'000 2006-07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Enlarged Cotter Dam				1,000	1,000	1,000	3,000
Murrumbidgee Extraction			2,000	2,000	2,000	2,000	8,000
Water Purification Plant demonstration - design							0
Smart Metering pilot	700	2,300	300				3,300
Total	700	2,300	2,300	3,000	3,000	3,000	14,300

5.2 *Enlargement of Cotter Dam*

Operating costs attributed to the Enlarged Cotter Dam amount to \$1.0 million per annum. Some details of the derivation of this amount have been provided in the Future Water Options Review report (ACTEW 2007a).

Direct operating costs comprise costs associated with:

- pumping to the Mt Stromlo Water Treatment Plant (pumping at flow rates of up to 180ML/day against a dynamic lift of up to 260 metres will be required);
- water treatment at Mt Stromlo; and
- fixed costs associated with operations and infrastructure upkeep.

Direct variable costs have been estimated at \$239/ML, primarily on the basis of historical operating costs at Cotter Reservoir. This amount comprises \$172/ML energy cost and \$67/ML other costs.

In the absence of a more detailed assessment, the estimated operating costs for the Enlarged Cotter Dam are considered appropriate.

5.3 *Murrumbidgee to Googong Transfer*

Operating costs attributed to the Murrumbidgee to Googong Transfer amount to \$2.0 million per annum. Details of the derivation of this amount from the information provided, however, it is expected that the costs will relate primarily to the cost of energy required for pumping.

Given that the expected annual transfer is expected to be in the order of 10-20GL, this would result in operating costs in the range \$100-\$200/ML, depending upon the amount expected to be transferred. This unit rate appears low in comparison to the unit rate quoted in respect to the Enlarged Cotter Dam option.

In the absence of a detailed assessment, the estimated operating costs for the Murrumbidgee to Googong Transfer are considered acceptable.

5.4 *Demonstration Water Purification Plant*

At this stage (ie under implementation of the Phase 1 water security measures), design only of the Demonstration Water Purification Plant is to proceed. Consequently, there is (and should be) no allocation of operating costs in respect to this measure within the price period.

5.5 *Smart Metering*

Estimates of operating cost for the Smart Metering pilot, as presented in the Information Paper (ACTEW 2007c) indicates a total operating cost of \$3.3 million over the project duration from 2007/08 to 2009/10. This varies significantly to the estimate of \$1.0 million included in the Business Case document (ACTEW 2008).

Further details of the actual proposed operating costs (taking into account the allocation of total costs between capital and operating expenditure) is required before an effective assessment can be made.

5.6 *Updated Estimates – Operating Expenditure*

ACTEW has recently (March 2008) prepared a further update of the estimated demand projections, which has in turn lead to an update in the estimate of operating expenditure over the period 2008/09 to 2012/13 (refer ACT Water Demand Projections Update Report (ActewAGL 2008a)).

Estimated combined operating expenditure for the Enlarged Cotter Dam and Murrumbidgee to Googong Transfer can be determined by assessing the difference in system operating costs when operating with existing infrastructure only as compared to operating with the planned new infrastructure included. These costs are presented in Table 24 and Table 25 respectively in the ACT Water Demand Projections Update Report (ActewAGL 2008a).

It is noted, however, that the operating costs related to the Murrumbidgee to Googong Transfer included energy costs only. ACTEW have subsequently advised that non-energy operating costs for this system would amount to approximately \$600,000 per annum. The resultant additional operating costs associated with the planned new infrastructure, based on the estimate for ‘medium’ population growth, are as presented in **Table 5.3**.

Operating costs associated with the Demonstration Water Purification Plant and the Smart Metering pilot project are assumed to remain the same.

Table 5.3 Updated Estimate of Operating Expenditure for Water Security Program (Phase 1) – 2008/09 to 2012/13 (\$'000 2006-07)

\$'000 nominal	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
Enlarged Cotter Dam plus Murrumbidgee Extraction			1,610	2,930	2,290	2,260	9,090
Water Purification Plant demonstration - design							0
Smart Metering pilot	700	2,300	300				3,300
Total	700	2,300	1,910	2,930	2,290	2,260	12,390

The figures shown in **Table 5.3** reveal an estimated reduction in operating costs for the Enlarged Cotter Dam and Murrumbidgee to Googong Transfer over the price period from \$11.0 million to \$9.09 million, a reduction of some \$1.91 million. It is noted that estimated operating costs over the price period for this infrastructure could potentially vary from \$2.90 million to \$16.94 million for low to high population growth respectively.

These revised estimates of operating costs for the Enlarged Cotter Dam and Murrumbidgee to Googong Transfer are deemed to have been determined in a more appropriate manner and are supported. It is, however, acknowledged that these costs have been determined using specific model operating rules and assumptions that may be subject to change once the enhanced system is operational.

6 Capital Program Delivery

6.1

Overview

An issue of potential concern is ACTEW's ability to deliver total capital program, including:

- the capital program as originally outlined in the report *Submission: Investigation into Prices for Water and Wastewater Services in the ACT; Regulatory period commencing 1 July 2008; Submission to the Independent Competition and Regulatory Commission*, prepared by ACTEW Corporation, September 2007 (ACTEW 2007h); and
- the water security measures, as outlined in the Information Paper (ACTEW 2007c).

A review of the capital expenditure profile over the current and forthcoming price period reveals a significant increase in proposed capital expenditure in the coming years in comparison to that achieved over the current price period. This is illustrated (in principle) in **Figure 6.1**.

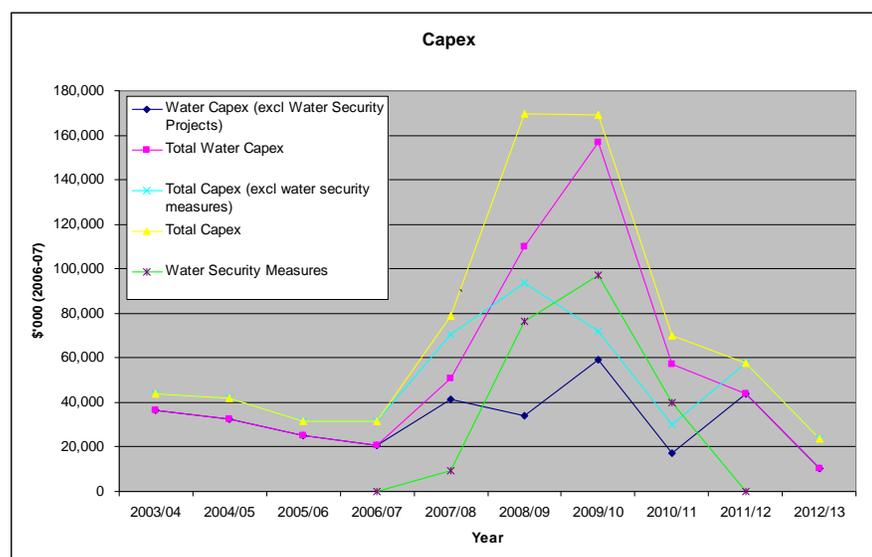


Figure 6.1 Capital Expenditure Profile

Note:

Figure is included to illustrate expenditure trends and not absolute Capex values. Capex values based on figures presented in ACTEW Submission to the ICRC (ACTEW 2007h) and Information Paper (ACTEW 2007c) and have not been updated to reflect subsequent information.

A review of **Figure 6.1** reveals that, in comparison to the average capital expenditure over the current price period (2003/04 to 2007/08):

- the originally proposed capital program represents an approximately twofold increase in annual expenditure in the first years of the next price period; and
- the total capital program, including the water security measures, represents an increase of up to approximately four times the past expenditure levels in the first years of the next price period.

Ability to deliver the capital program will be dependent upon both ACTEW/ActewAGL's ability to effectively manage delivery, and the capacity of the consulting and construction industries to deliver the program within the required timeframe. There is, and will continue to be, significant competition for consulting and construction resources within the water sector as well as other competing sectors.

It is anticipated that, due to the focus on securing the long-term security of water supply, delivery of the water security measures is likely to be achieved. There remains, however, a question as to how the remainder of the program will be delivered.

6.2

Proposed Delivery Mechanisms

Discussions with ACTEW have revealed that ACTEW/ActewAGL is cognisant of the pressures that may impact on the ability to deliver the proposed capital program, and have acknowledged that delivery will be challenging.

In order to address these concerns, ACTEW has proposed delivery of the water security measures in the following manner:

- *Bulk Water Alliance:*
The Cotter Dam Enlargement and Murrumbidgee River to Googong Transfer projects have been combined, along with the Googong Spillway Upgrade project for delivery under a Bulk Water Alliance. This alliance arrangement will comprise ACTEW, a design consultant, a constructor and ActewAGL (as operator).
- *Water Purification Alliance:*
The design and subsequent construction (if it proceeds) of the proposed Demonstration Water Purification Plant will also be implemented under an alliance arrangement. Partners to the alliance will again comprise ACTEW, a design consultant, a constructor and ActewAGL (as operator).

- *Smart Metering Project:*
This project is to be implemented by ActewAGL.

In order to support delivery of the program, ACTEW has engaged a number of high calibre personnel over the last 12 to 18 months. This action, coupled with the introduction of improved processes over the last two to three years, has already resulted in improved delivery performance.

In respect to delivery of the water security measures, a dedicated team has been drawn from within both ACTEW and ActewAGL. This team generally comprises personnel who have previously been involved in the planning and development of the water security program.

ACTEW's expectation is that the Water Security Program alliances will help, rather than hinder, the delivery of capital programs. It is anticipated that the alliances will allow access to contractors who have used the process to form a good working relationships with ACTEW. Furthermore, there is room to include other projects under the alliance banners in the coming years.

ACTEW indicated that it has commenced the 'bundling' of projects that occur annually and is also speaking with organisations to secure the 'bundling' of other suitable projects.

6.3

Assessment of Delivery Capacity

Discussions with ACTEW have revealed that they have taken appropriate measures to maximise the likelihood of delivering the proposed capital program over the coming years. Success will, nonetheless, still be somewhat dependent upon industry capacity. It will also be dependent upon the time taken to secure the relevant environmental and planning approvals that have been identified (albeit briefly) in **Section 3**.

It is understood that the timing of securing partners for the Bulk Water Alliance has been successful in gaining a high level of interest from parties that are reaching the end of current commitments to work in other states. This provides some confidence that appropriate resources will be available to implement the capital program.

The delivery program inferred by the cash flow profiles presented in the recent ACT Water Demand Projections Update Report (ActewAGL 2008a) indicates a deferment of all expenditure on the Water Security Program projects (except design of the Demonstration Water Purification Plant) from 2007/08 to 2008/09.

This deferment appears to acknowledge the fact that minimal design activity is now likely to occur within the current financial year, and is to be supported. This deferment has, however, resulted in increased expenditure levels in 2008/09 and 2009/10 as the completion dates for the water security measures have not been moved (they remain aligned to the timeframes set out in the Water Security Taskforce recommendations (ACT Government 2007)).

As outlined in **Section 3**, ACTEW are implementing a number of strategies to facilitate early approval of environmental and planning approvals. Most notable is the high level of environmental assessment activity being undertaken at an early stage of the respective projects. The intent to have the proposed Murrumbidgee to Googong Transfer pipeline project assessed under the NSW Pipelines Act is another example.

In summary, it is recognised that ACTEW is cognisant of the potential difficulties associated with delivery of the proposed capital program and have taken appropriate actions to maximise the likelihood of timely delivery. Notwithstanding this action, there remains a clear element of risk that timely delivery of the program can in fact be achieved, primarily as a result of influences beyond ACTEW's control. This is illustrated simply in **Table 6.1**.

Table 6.1 Program Delivery Issues

Delivery Issue	Appropriate Action by ACTEW	Likelihood of Program Achievement
Internal project management capacity	✓	✓
Industry capacity to deliver	✓	?
Timely securing of approvals	✓	?

Sound management overview, together with robust monitoring and reporting of progress against program milestones will be required as part of an effective risk management approach.

7 Conclusions

The review of proposed capital and operating expenditure associated with implementation of the proposed water security measures to service consumers in the ACT, as outlined in this report, has led to the following conclusions:

- ACTEW have followed an extensive, robust process for the identification of prudent and efficient options aimed at ensuring the long-term security of water supply for the ACT.
- Justification for the proposed Water Purification Plant is not clearly apparent, however, appears to be primarily aimed at diversifying water source so that the ACT is not entirely dependent upon rainfall in existing catchments.
- The regular (annual) review of planning assumptions and assessment of the resultant impact is considered good practice.
- It is noted that worst case climate change/variability scenarios have been adopted for planning purposes. Given that the true impact of climate change is as yet unknown, it is considered appropriate to plan (be prepared for), but not necessarily implement for the worst case scenario. The challenge here is the identification of appropriate “trigger points”, ie knowing when to act.
- In respect to the specific projects:
 - the Enlargement of Cotter Dam appears to have been well justified and is considered prudent;
 - the Murrumbidgee to Googong Transfer again appears to have been well justified and is considered prudent;
 - justification for the proposed Water Purification Plant is not clearly apparent, however, appears to be primarily aimed at diversifying water source so that the ACT is not entirely dependent upon rainfall in existing catchments. The potential for using effluent from the LMWQCC on a ‘replacement flows’ basis was proposed, however, it is understood that the need for advanced treatment of the effluent is, in part, based on the need to improve the effluent quality (in respect to salt and nitrogen) for environmental discharge purposes and not only to facilitate potential potable reuse; and
 - the potential benefits of Smart Metering in respect to water use and expenditure appear to be minimal, although it is acknowledged that the pilot project is aimed at gaining a better understanding of the benefits to be gained.

- In respect to the proposed capital expenditure:
 - the process followed in developing of the estimated capital costs associated with the Enlargement of Cotter Dam (\$145 million) is considered to be robust, and there can be confidence that it allows for the efficient implementation of the project;
 - whilst the original (2005) [\$35 million] estimate of the capital costs associated with the Murrumbidgee to Googong Transfer can be considered robust, the 2007 [\$70 million] estimate appears to have been excessively inflated to bring it to current values. The allowance (on a percentage basis) of upsizing from 60ML/day to 100ML/day capacity appears reasonable. More recent information provided in response to the Draft Review Report, however, presents a more detailed estimate which is based on a more defined scope of work. This estimate is considered to provide robust justification for an estimated capital cost of \$96.5 million;
 - the estimated design cost for the Demonstration Water Purification Plant as initially proposed (\$6 million) appeared reasonable on the basis of the expected capital cost, however, the most recent forecast (\$9.8 million – March 2008) is considered excessive; and
 - there appears to be a misalignment between the capital and operating costs associated with the Smart Metering pilot project as reported in the Information Paper (ACTEW 2007c) and the Business Case document (ACTEW 2008). Furthermore, there is no indication that the costs are to be apportioned amongst the three services to which the pilot project is to be applied, ie electricity, gas and water. Nonetheless, the compilation of the proposed capital expenditure as reported in the Business Case document appears to cover the various project elements.

- In respect to proposed operating costs:
 - in the absence of detailed information and a corresponding assessment, the proposed operating costs associated with the Enlargement of Cotter Dam are considered appropriate;
 - again, in the absence of detailed information and a corresponding assessment, the proposed operating costs associated with the Murrumbidgee to Googong Transfer are considered appropriate;
 - design only of the Demonstration Water Purification Plant is proposed under the Phase 1 water security measures. Consequently, no operating costs are currently proposed; and
 - as noted in respect to the proposed capital expenditure, there appears to be a misalignment between the reported capital and operating costs associated with the Smart Metering pilot project, thereby making a clear assessment of the proposed expenditure difficult.

- In respect to delivery of the capital program:
 - Halcrow has some concern about the ability to deliver ACTEW's total capital program given the large increases in annual expenditure compared to that delivered by ACTEW in recent years and the high level of market activity;
 - ACTEW are cognisant of the potential difficulties and have taken appropriate actions to maximise the likelihood of timely delivery;
 - ACTEW is understood to have improved its management processes and has consolidated its resources to effectively manage program delivery;
 - ACTEW has taken steps, including the use of alliance arrangements, the 'bundling' of projects and timely procurement to maximise its success in securing adequate resources; and
 - ACTEW is implementing strategies to facilitate approval of environmental and planning approvals in a timely manner.
 - notwithstanding these positive actions, there remains a potential risk that timely delivery of the program may be impacted by a protracted approvals process and market capacity.

- Whilst not specifically addressed in the preceding discussions, it is noted ACTEW has forecast some off-setting of the additional greenhouse gases generated by the water security measures through the (potential) inclusion of hydropower generating facilities as part of the projects. This correlates with one of the measures (not assessed in this report) included in the announcement made by the Chief Minister and Minister for the Environment, Water and Climate Change on 23 October 2007 (refer **Section 2.1**).

8 Recommendations

In view of the assessment and conclusions set out in this report the following recommendations are made in respect to the proposed capital and operating expenditure associated with implementation of the proposed water security measures:

- In respect to the *Enlarged Cotter Dam*:
 - the proposed capital expenditure be adopted, with the cash flow based on the recent update provided by ACTEW; and
 - the proposed operating costs (as included in the most recent update provided by ACTEW) be adopted.
- In respect to the *Murrumbidgee to Googong Transfer*:
 - the proposed capital expenditure be reduced (from \$105 million) to \$96.5 million (based on the latest estimate information), with the cash flow based on a proportional reduction of the recent update provided by ACTEW; and
 - the proposed operating costs (as included in the most recent update provided by ACTEW) be adopted.
- In respect to the *Demonstration Water Purification Plant*:
 - further consideration be given to the need for a demonstration plant given that the treatment technology to be used has already been proven in a number of jurisdictions; and
 - if it is to proceed, the initially proposed design cost of \$6 million be adopted.
- In respect to the *Smart Metering Pilot Project*:
 - as the potential benefit (although deemed to be limited) relates to water savings, consideration be given to incorporating the project as part of the existing leakage reduction program, or seeking alternative external funding on a research and development basis;
 - consistent cost estimates be provided; and
 - an appropriate cost allocation be made between the three services (water, electricity and gas). For indicative purposes, and in the absence for any detailed (cost based) justification otherwise, it is suggested that a split of 40% water, 40% electricity and 20% gas could be made. Based on the cost estimates presented in the Business Case document (ACTEW 2008), ie capital cost \$6.0 million and operating cost \$1.0 million, the allocation to water would be \$2.4 million and \$0.4 million respectively.

On this basis, recommended expenditure allocations for capital and operating expenditure are set out in Table 8.1 and **Table 8.2** respectively.

**Table 8.1 Estimated Capital Expenditure for Water Security Program
 (Phase 1) – 2007/08 to 2012/13 (\$'000 2006-07)**

\$'000 nominal	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
<i>Initially Proposed by ACTEW (November 2007)</i>							
Enlarged Cotter Dam	5,000	30,000	70,000	40,000			145,000
Murrumbidgee Extraction	1,000	42,000	27,000				70,000
Water Purification Plant demonstration - design	3,000	3,000					6,000
Smart Metering pilot	300	1,200	200				1,700
Total	9,300	76,200	97,200	40,000	0	0	222,700
<i>ACTEW Updated Estimates (March 2008)</i>							
Enlarged Cotter Dam		20,600	82,800	41,600			145,000
Murrumbidgee Extraction		53,700	51,300				105,000
Water Purification Plant demonstration - design	3,800	6,000					9,800
Smart Metering pilot		1,300	200				1,500
Total	3,800	81,600	134,300	41,600	0	0	261,300
<i>Halcrow Recommended</i>							
Enlarged Cotter Dam		20,600	82,800	41,600			145,000
Murrumbidgee Extraction		49,400	47,100				96,500
Water Purification Plant demonstration - design	3,000	3,000					6,000
Smart Metering pilot		2,200	200				2,400
Total	3,000	75,200	130,100	41,600	0	0	249,900

**Table 8.2 Estimated Operating Expenditure for Water Security Program
 (Phase 1) – 2007/08 to 2012/13 (\$'000 2006-07)**

\$'000 2006-07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total
<i>Initially Proposed by ACTEW (November 2007)</i>							
Enlarged Cotter Dam				1,000	1,000	1,000	3,000
Murrumbidgee Extraction			2,000	2,000	2,000	2,000	8,000
Water Purification Plant demonstration - design							0
Smart Metering pilot	700	2,300	300				3,300
Total	700	2,300	2,300	3,000	3,000	3,000	14,300
<i>ACTEW Updated Estimates (March 2008)</i>							
Enlarged Cotter Dam plus Murrumbidgee Extraction			1,610	2,930	2,290	2,260	9,090
Water Purification Plant demonstration - design							0
Smart Metering pilot	700	2,300	300				3,300
Total	700	2,300	1,910	2,930	2,290	2,260	12,390
<i>Halcrow Recommended</i>							
Enlarged Cotter Dam plus Murrumbidgee Extraction			1,610	2,930	2,290	2,260	9,090
Water Purification Plant demonstration - design							0
Smart Metering pilot		200	200				400
Total		200	1,810	2,930	2,290	2,260	9,490

9 References

- ACT Government 2007 *Next Steps to Ensure Water Security for the ACT Region*, prepared by the Water Security Taskforce and Water Security Advisory Panel, September 2007.
- ACTEW 2004a *Options for the next ACT Water Source*, prepared by ActewAGL for ACTEW Corporation, April 2004.
- ACTEW 2004b *An Assessment of the Need to Increase the ACT's Water Storage*, prepared by ACTEW Corporation, December 2004.
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