

ACT Auditor-General's Office

Performance Audit Report

<p>Water Demand Management <i>Administration of Selected Initiatives</i></p>

ACTEW Corporation Limited
**Department of the Environment, Climate Change,
Energy and Water**

June 2010



ACT AUDITOR-GENERAL'S OFFICE



PA0908

The Speaker
ACT Legislative Assembly
Civic Square, London Circuit
CANBERRA ACT 2601

Dear Mr Speaker

I am pleased to forward to you a Performance Audit Report titled **'Water Demand Management: Administration of Selected Initiatives'**, for tabling in the Legislative Assembly, pursuant to Section 17(5) of the *Auditor-General Act 1996*.

Yours sincerely

Tu Pham
Auditor-General
29 June 2010

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LIST OF ABBREVIATIONS AND DEFINITIONS

ACTEW	ACTEW Corporation Limited
ACTPLA	ACT Planning and Land Authority
Aquifer	Rock or sediment in a formation, group of formations, or part of a formation which is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs.
CIUWP	Canberra Integrated Urban Waterways Program
CMD	Chief Minister's Department
CSIRO	Australian Commonwealth Scientific and Industrial Research Organisation
DECCEW	Department of the Environment, Climate Change, Energy and Water
EPA	Environment Protection Authority
GL	Gigalitre: 1 000 megalitres
ICRC	Independent Competition and Regulatory Commission
Inflows	Surface water runoff and deep drainage to groundwater (groundwater recharge) and transfers into the water system (both surface and groundwater), for a defined area.
KL	Kilolitre: 1 000 litres
ML	Megalitre: 1 000 000 litres (or 1 000 kilolitres)
Minister	Minister for the Environment, Climate Change and Water.
NWC	National Water Commission
TAMS	Department of Territory and Municipal Services
Treasury	Department of Treasury
WCO	Water Conservation Office (ACTEW)

1. REPORT SUMMARY AND AUDIT OPINION

INTRODUCTION

- 1.1 This report presents the results of a performance audit that reviewed the administration of selected ACT Government measures to manage water demand and related initiatives.

BACKGROUND

- 1.2 The ACT Government, in common with governments in other jurisdictions in Australia, has recognised the importance of securing an adequate water supply to meet the needs of the community, and which takes into account a range of environmental and demographic issues that affect both water supply and water demand. The ACT Government has documented its strategy for the management of the ACT's water resources in *Think water, act water*, which was released in 2004.¹ Among other things, *Think water, act water* proposes a range of water efficiency measures that seek largely to reduce per capita potable water use.
- 1.3 Water management is a national environmental issue. The following figures show that the ACT region is no exception to the need to introduce water efficiency measures:
- in 2006 Canberra's water consumption was just over 58 GL;
 - only 26 GL flowed into the ACT water catchment in 2006, 86 percent below the long-term average inflow;
 - a report prepared for the Chief Minister's Department in 2007 by the Water Security Taskforce noted modelling by the CSIRO in 2003 of 'worst case' average inflows by the year 2030 of 105 GL per year and 2070 of 48 GL per year. The actual average inflows between 2001 and 2007 were 70 GL. In other words, by 2007 the Canberra dam inflows were 33 percent (or 35 GL) below the CSIRO worst case average for 2030.²
- 1.4 The analysis included in the CSIRO report shows that Canberra's water availability from 2002 to 2009 was unexpectedly low. Canberra has reached a point where water management is required much earlier than expected.
- 1.5 In November 2008, the ACT Government established the Department of the Environment, Climate Change, Energy and Water (DECCEW). DECCEW, amongst other things, has key responsibilities in developing and implementing policies and programs to ensure more sustainable use of water.

¹ The 2004 *Think water, act water* strategy is a water resources policy and along with the accompanying implementation plan, provides a framework for a partnership between the community and the ACT Government in managing, using and conserving the water resources of the region from 2004 through to 2050. The Strategy is available from www.thinkwater.act.gov.au.

² Audit understands that the circumstances of the last 7 years have been so far from the average that modelling could not anticipate such changes.

Report summary and audit opinion

1.6 As a new Department, DECCEW has faced significant challenges in bringing together functions from various agencies and introducing a more robust management regime across its program responsibilities. This has included addressing deficiencies that already existed as a result of the many administrative changes around water policy and programs, prior to these being amalgamated into DECCEW.

AUDIT OBJECTIVES AND SCOPE

1.7 The objective of this audit was to provide an independent opinion to the Legislative Assembly on whether selected measures in the 2004 *Think water, act water* strategy, and related initiatives, have been managed in an effective and efficient manner to deliver the intended outcomes.

1.8 This audit assessed the ACT Government's management of water demand by focussing on three areas:

- Permanent Water Conservation Measures and Temporary Water Restrictions;
- selected residential water saving initiatives; and
- the Flemington Roads Ponds Project as part of the broader Canberra Integrated Urban Waterways Program (CIUWP).

1.9 The audit did not examine the supply side of water management.

1.10 Appendix A provides details of the audit criteria, approach, and methodology.

AUDIT OPINION

1.11 The audit opinions drawn against the audit objectives are set out below.

Overall, various water demand management measures, delivered under the ACT Government strategy *Think water, act water*, and related initiatives have contributed to significant water saving targets. These include Permanent Water Conservation Measures, Temporary Water Restrictions, residential water saving initiatives, pricing and public awareness.

The administration of various water savings initiatives delivered mixed results:

- Permanent Water Conservation Measures and Temporary Water Restrictions were well managed and achieved significant water savings;
- Selected residential water initiatives audited had low take-up rates and water savings were likely to be over-estimated;
- The Flemington Road Ponds Project, a pilot project within the Canberra Integrated Urban Waterways Project (the Program), experienced significant delays and no non-potable water has been supplied to any end-user as originally intended. DECCEW is progressing on a number of issues to meet revised targets for the Program.

DECCEW needs to improve the reliability of the measures of water savings and compile sufficient and up-to-date information to assess the effectiveness and relative merit of various residential water saving initiatives.

KEY FINDINGS

Canberra's water strategy (chapter 2)

- The ACT Government's strategy *Think water, act water* in 2004, sets a water management framework and establishes long-term water saving targets. However, the targets and the methodology used to assess achievements against these targets need to be clearly defined for consistency and clarity across all agencies. This will assist consistent dissemination of information to the public and in monitoring and reporting progress against the strategy.
- The ACT Government intended to review *Think water, act water* every five years, and the implementation plan annually. The first review of the Strategy commenced in January 2010. Progress reports have been less frequent than intended. At the time of this audit, only two progress reports have been published since 2004; the first in January 2006 covering 2004-05, and the second undated report covering the period 2005-07. Since the audit, the third progress report covering 2007-08 and 2008-09 was released on 9 June 2010.

- Water demand modelling has been regularly reviewed to reflect the significant changes to the Canberra water situation.

Permanent water conservation measures and temporary water restrictions (Chapter 3)

- ACTEW and its Water Conservation Office managed the level of restrictions and related community issues well. Within the Schemes approved by the Minister, ACTEW made decisions on Temporary Water Restrictions and Permanent Water Conservation Measures based on many factors including varied community views, predicted weather forecast, dam storage levels, Canberra's current and expected water consumption and catchment inflows.
- Under the *Utilities (Water Conservation) Regulation 2006*, ACTEW is required to work in consultation with the Environment Protection Authority to develop the Permanent Water Conservation Measures and Temporary Water Restrictions. However, there was little effective consultation for the last decisions taken in 2006 regarding water restrictions. A failure to adequately consult could result in a higher risk that a recommendation made by ACTEW and supported by the Minister lacked appropriate whole-of-government input. Since November 2008, there has been better communication on water issues as the water policy, functions and programs are now centred in the new Department, DECCEW.
- Agencies used different and changing methods and assumptions to measure water consumption targets, using base consumption levels ranging from 174 KL to 217 KL per person to calculate water savings against targets. This could lead to a lack of consistency and clarity in reporting results of water savings to the ACT Government and to the public. DECCEW recently advised that agreement has been reached to use 182 KL as the base consumption level.
- Care should be taken around reporting of water savings to the public, to ensure savings are not overstated. Currently, ACTEW adopts a water consumption level assuming no water restrictions in place as a base line, and calculates water savings against this base line number. This approach has the potential to overstate achievements in water savings over time, and may not adequately recognise and communicate to the ACT community the increasing challenge of delivering further savings on top of those already achieved from the Permanent Water Conservation Measures.
- Storage levels in the ACT's dams are used by ACTEW as one of the factors to trigger the possible introduction or variation of water restrictions. There was no consistent correlation between the restriction level indicated by dam storage levels and the actual restrictions in place. This suggests that dam storage levels have far less significance in determining water restriction levels than other factors. It would enhance the transparency if all the factors

used by ACTEW in its decision making process, and the relative ‘weighting’ of these factors, were made readily available to the public.

- ACTEW ran extensive and effective community education and awareness campaigns. ACTEW’s involvement with the community to increase awareness has played a major part in the success of the water restrictions.

Residential water initiatives (Chapter 4)

- DECCEW has a project management system designed to meet the specific needs of the sustainability programs, including the water saving initiatives reviewed by Audit. The system, however, was not being used to assist the management and reporting of all water initiatives. The Department is in the process of implementing the recommendations of a 2009 internal audit, including reviewing its existing project management system, improving record keeping and reporting.
- Take-up rates for the residential water saving initiatives reviewed were below the assumption rates, and were small relative to the population of the Territory.
- Although the Department reviewed some residential water measures, it did not update the water savings estimates for these measures based on experience to date. The water savings used for modelling and reporting are likely to be overstated.
- The management of residential water efficiency incentives was transferred from ActewAGL to CMD, TAMS and now DECCEW. Since the transfer in 2007, annual reports prepared by ActewAGL under contract ceased. The biennial reports on the *Think water, act water* action plan published since 2007 did not provide information on the effectiveness, or relative merit of residential measures, especially in regard of water saving outcomes.
- Based on information available to Audit, there was no clear evidence that the selected residential water measures achieved the expected water saving outcomes. For example:
 - studies done on the rainwater tank program in 2005 and 2008, questioned the extent of water savings from this measure;
 - there was no conclusive data on water savings from the GardenSmart program; and
 - although the ToiletSmart program has achieved a significant increase in participation in the past year, it has still fallen short of assumed participation rates.

Flemington Road Ponds Project (Chapter 5)

- The Flemington Road Ponds Project was the first stage of a larger project—the Canberra Integrated Urban Waterways Project (CIUWP) - to provide non-potable water to sportsgrounds and recreational areas.
- DECCEW took over the management of the CIUWP program from TAMS in November 2008.
- The construction of the Flemington Road Ponds Project was planned for completion in June 2008, but actual completion (without landscaping) occurred in October 2009.
- The pilot project allowed opportunity to address issues like asset ownership and pricing of non-potable water. These issues are being progressed and still to be considered by the Government.
- The Flemington Road ponds are not yet supplying non-potable water to end users, and none of the expected water savings from the CIUWP has been delivered as originally intended (1.5 GL of non potable water by 2010). DECCEW expects the supply of non-potable water to occur in 2011, and the CIUWP target of 3 GL to be met by the revised timetable of 2015, as re-negotiated with the Commonwealth.
- Funding arrangements established between the Commonwealth and ACT Governments included \$3.3 million to be generated by developer contributions. The developer contribution scheme has been reconsidered, so none of the \$3.3 million has been raised. The ACT Government will have to meet this shortfall.

RECOMMENDATIONS AND RESPONSE TO THE REPORT

- 1.12 The Audit made eight recommendations to address the audit findings detailed in this report.
- 1.13 In accordance with section 18 of the *Auditor-General Act 1996*, a final draft of this report was provided to the Chief Executive of the DECCEW, and the Managing Director of ACTEW for consideration and comments. The overall responses received are shown below:

ACTEW's Response:

We note and are pleased with the findings and comments in relation to the way ACTEW has managed Permanent Water Conservation Measures and Temporary Water Restrictions, and more broadly about ACTEW's contribution to managing water demand in the ACT. ACTEW is pleased with the overall finding of the Auditor-General regarding the water savings achieved, and successful management and communication of Permanent Water Conservation Measures and Temporary Water Restrictions. The significant reduction in water demand

since 2002 arising from water restrictions has been the most important response to the dramatic weather change the ACT has experienced in that time. Community support for water restrictions has been commendable, and ACTEW is pleased that this review shows we have also played our part in ensuring the water savings have been delivered.

DECCEW's Response:

I do not believe that the audit properly takes account of the circumstances arising from the relatively recent establishment of the Department nor the changes I have instituted to introduce a more robust management regime across our Programs area.

As part of this reform process, WalterTurnbull was engaged by the Department in 2009 to undertake a review of three 2008-09 sustainability programs (i.e. ToiletSmart, ACT Energy Wise, and the Home Energy Advice Team). The Department is responding to the WalterTurnbull review.

1.14 In addition, responses have been provided to each recommendation.

Recommendation 1 (Chapter 2)

DECCEW, in consultation with ACTEW, should:

- clearly define the method being used to assess outcomes against the water consumption targets in the *Think water, act water* Strategy and in the Implementation Plan;
- ensure the method is robust and used consistently by all relevant agencies;
- formally approve and document any variations to the method that may occur over time; and
- provide relevant information to the public.

ACTEW's Response:

Agreed: *ACTEW will work with DECCEW to implement the recommendation.*

DECCEW's Response:

Agreed: *DECCEW will work with ACTEW to implement the recommendation.*

Recommendation 2 (Chapter 3)

ACTEW should consult appropriately with the Environment Protection Authority (EPA) on any proposals or decisions on Temporary Water Restrictions or Permanent Water Conservation Measures.

ACTEW's Response:

Agreed in part: *Consultation with EPA was last required prior to the change of stage 3 restrictions in December 2006. Since then there have been a number of changes within the structure of the ACT Government, with EPA now part of DECCEW. ACTEW and DECCEW have very strong communication links. Further, the Chief Executives Water Group (CEWG) and the Senior Executives Water Group (SEWG) have been established as ongoing forums for discussion of water issues. ACTEW and DECCEW are both active participants in these groups. All water issues, including water restrictions, are permanently on the agenda of these two groups. To the extent this is an inconsistency between the current practice and the regulation, it may be more appropriate to change the Regulations to reflect the new ACT Government structure.*

DECCEW's Response:

Agreed: *The Department agrees with ACTEW's comments.*

Recommendation 3 (Chapter 3)

ACTEW should update its procedures to reflect a consultative approach as required by the *Utilities (Water Conservation) Regulations 2006*. All consultation should be documented.

ACTEW's Response:

Agreed: *Whilst informal discussions have been held between ACTEW and EPA, ACTEW accepts there are insufficient records to indicate consultation did occur. ACTEW has updated procedures since the last change in the restriction level in November 2006, and will re-examine these procedures in light of this recommendation. The issue regarding a possible change to the regulation, as discussed in ACTEW's response to Recommendation 2, also applies to this recommendation.*

DECCEW's Response:

Noted.

Recommendation 4 (Chapter 3)

For future reporting, ACTEW should consider the measurement of water savings against a new consumption baseline that does not include the savings already achieved from the Permanent Water Conservation Measures. In the interim period, ACTEW should make it clear to the community that the savings are a combined result from Temporary Water Restrictions and the ACT Government's demand management program.

ACTEW's Response:

Agreed: *ACTEW considers this water restriction 'event' is one continuous event, starting in December 2002. When this event is over, and a new baseline is established, then, certainly, any future event will be measured against that new baseline. However ACTEW will try to be clearer about the pre-restriction baseline and other contributions to savings, when communicating water saving statistics.*

DECCEW's Response:

Noted.

Recommendation 5 (Chapter 3)

ACTEW should improve the transparency of its decision making process by providing, to the extent practicable, information to the public of the relative significance or weighting of the key factors considered by ACTEW in selecting stages of water restrictions.

ACTEW's Response:

Agreed in part: *ACTEW notes the audit comments on the comprehensive documentation and data used to support a recommendation regarding water restrictions and the audit finding that ACTEW ran an extensive and effective community education and awareness program that played a major part in the success of water restrictions. ACTEW conveys the key factors that have led to a change in restriction level, whilst at the same time keeping the public message simple, in order to communicate it well. ACTEW will consider ways to increase the transparency of decision making at the next change of restriction level.*

DECCEW's Response:

Noted.

Recommendation 6 (Chapter 4)

DECCEW should implement its custom-made project management system to manage water saving initiatives. This will encourage consistent management practices, including the centralised recording of relevant information, which will facilitate reporting and evaluation of the initiatives.

DECCEW's Response:

Agreed in principle: *This issue was highlighted in the WalterTurnbull review commissioned by the Department and is currently being addressed. Full implementation of the project system has not been possible to date due to temporary resourcing constraints.*

However, it should be noted that the Department, in the absence of full implementation of the project management system, has been utilising its established systems to monitor programs, including budgets.

Recommendation 7 (Chapter 4)

DECCEW should ensure data used for estimates and assumptions for water savings from residential initiatives is updated and verifiable.

DECCEW's Response:

Agreed: *The Department undertakes this as part of management of its programs. The calculations used for water savings are technically sound and based on best available information and updated as new data becomes available.*

Recommendation 8 (Chapter 5)

DECCEW should:

- progress with the developer contributions to the cost of delivering the Canberra Integrated Urban Waterways Project as originally planned, or
- if developer contributions are not to be pursued, seek approval from the ACT Government of revised funding arrangement and formally advise the Commonwealth government and seek an amendment to the Funding Deed.

DECCEW's Response:

Agreed in principle: *The matter of Developer Contributions is currently being addressed in concert with the ACT Planning and Land Authority. The Department is satisfied, however, that the project funding provided by the ACT Government over the past four years more than offsets this notional foregone revenue. The Department will address this issue with the Commonwealth in the context of the Funding Deed as it has on all other relevant matters.*

2. CANBERRA'S WATER STRATEGY

INTRODUCTION

- 2.1 Canberra has a limited amount of water. In the past, given historical dam levels and reliable inflows, the water consumption levels of the Canberra region required no monitoring or modification. However, unlimited water consumption is no longer sustainable.
- 2.2 This chapter provides background information on the available water in Canberra's catchments, water consumption and inflows, and examines the ACT Government's approach to managing the limited water resource.
- 2.3 There are two sides to water management; supply and demand. In the ACT, supply is being addressed by enlarging the Cotter Dam and investigating access to other water sources. Water demand management is primarily concerned with the implementation of policies or measures that control or influence the amount of water used, especially by encouraging efficient water use and minimising wasteful use of water.
- 2.4 Canberra's available water has been low over the last five years, due to many factors, including drought conditions. Supply of water to Canberra should be improved by building a larger dam, but given recent low inflows the dam will take many years to fill, and Canberra's water consumption is likely to increase with population growth. Managing demand for water will therefore remain an important component of managing available water resources.

KEY FINDINGS

- The ACT Government's strategy *Think water, act water* in 2004, sets a water management framework and establishes long-term water saving targets. However, the targets and the methodology used to assess achievements against these targets need to be clearly defined for consistency and clarity across all agencies. This will assist consistent dissemination of information to the public and in monitoring and reporting progress against the strategy.
- The ACT Government intended to review *Think water, act water* every five years, and the implementation plan annually. The first review of the Strategy commenced in January 2010. Progress reports have been less frequent than intended. At the time of this audit, only two progress reports have been published since 2004; the first in January 2006 covering 2004-05, and the second undated report covering the period 2005-07. Since the audit, the third progress report covering 2007-08 and 2008-09 was released on 9 June 2010.
- Water demand modelling has been regularly reviewed to reflect the significant changes to the Canberra water situation.

BACKGROUND

- 2.5 There are four major components affecting Canberra's available water supply:
- storage (dams);
 - water entering the dams (inflows);
 - water consumption; and
 - water that is released from the dams to replicate natural river flows (environmental flows).
- 2.6 These components are discussed briefly below to explain why Canberra is faced with significant water management challenges.

Storage

- 2.7 Canberra's available water is stored in four dams; the Cotter, Bendora, Corin, and Googong dams. The dams have a current total storage capacity of 207.4 GL, which will increase to 281.4 GL with completion of the Cotter dam enlargement. Actual storage has been considerably less than capacity over recent years. In January 2001, the dams were at 96 percent capacity, but this dropped to a low of 30 percent in June 2007. In March 2010, the dams were, on average, just above 50 percent capacity overall. This equates to about 112 GL.³
- 2.8 Appendix B provides further information on dam storage levels since 2001.

Inflows

- 2.9 'Inflows' is the term given to water entering dams and other water catchments. Canberra's average long-term annual inflows are just above 200 GL, calculated over the period from 1871 to 1993. Inflows over recent years, however, have been well below the long-term average. The average annual inflows for the period from January 2002 to December 2009 was 78 GL, and inflows for 2006 were the lowest on record at 26 GL.
- 2.10 Appendix C provides more information on inflows.

Canberra's water consumption

- 2.11 In 2004, the ACT was reported to be consuming about 65 GL⁴ of water per year. Water restrictions and other water saving initiatives have brought the seven year average water consumption (from July 2002 to June 2009) down to 51.9 GL.

³ 207.4 dam capacity x 54 percent (12 March 2010 figure 54.38 percent) = 111.99 GL.

⁴ *Think water, act water, Volume 1; Strategy for Sustainable Water Resource Management in the ACT*, April 2004, Publishing Services, Canberra, p 20.

Canberra's water consumption figures are reported by ActewAGL on its website (Water – Facts and Figures).

Environmental flows

- 2.12 The natural water flow of the Territory's rivers and streams has been altered significantly by the use of dams, weirs, and pumps. This has resulted in significant degradation in the health of many rivers. Environmental flows, which are defined as 'the flows of water in our streams and rivers that are necessary to maintain aquatic ecosystems', are used to maintain the health of rivers and streams, with the intention of mimicking flows that would occur naturally.
- 2.13 Canberra's environmental flows are set by the *Water Resources Act 2007* and the *Water Resources Environmental Flow Guidelines 2006* issued under the Act. Changes to the environmental flows require a submission to, and approval by, the Minister. ActewAGL manages the environmental flows of the four dams.
- 2.14 Environmental flows are allocated from the total available water storage and are not part of the Canberra water consumption figures. In 2004, it was reported that of 494 GL of available water, 269 GL was dedicated to environmental flows.⁵ From January 2009 to December 2009 the total environmental flows released from all four dams totalled 35 GL.
- 2.15 A report prepared by ActewAGL titled *Future Water Planning 2008* to review the planning variables for water supply and demand assessment stated:
- Environmental flows are protected as first priority. However, the 2006 Environmental flow guidelines require considerably less water to be released under normal conditions than the previous (1999) Guidelines. Under the 2006 guidelines 15 ML [per] day is the required environmental flow.⁶
- 2.16 Environmental flow reductions are permissible in times of drought to secure domestic supply. Drought conditions are defined in the Environmental Flow Guidelines as the period when Temporary Water Restrictions are in place. The imposition of Permanent Water Conservation methods does not trigger 'water supply drought' conditions. For example, in 2007, environmental flows were reduced from 15 ML per day to 5 ML per day, following a recommendation to the Minister from ACTEW.

⁵ *Think water, act water, Volume 1; Strategy for Sustainable Water Resource Management in the ACT*, April 2004, Publishing Services, Canberra, p 20.

⁶ *Future Water Planning 2008 Review of Planning Variables for Water Supply and Demand Assessment, A review of the changes in modelling assumptions for Future Water Options for the ACT*, prepared by Infrastructure Development Branch Water Division, p 43.

ACT GOVERNMENT'S APPROACH TO WATER MANAGEMENT

- 2.17 The ACT Government has participated in water reforms as part of the 1994-1995 National Competition Policy Agreement established by the Council of Australian Governments (COAG). Since 1998, the ACT has also joined with the NSW, South Australia, Victoria, Queensland, and Commonwealth governments in the *Murray-Darling Basin Initiative*. This included a commitment to take part in a program to limit how much water is drawn from the Murray-Darling River system, known as the *Cap on Diversions*. Canberra is the largest urban centre in the Murray-Darling Basin.
- 2.18 In 2003, the ACT Government implemented a water management framework that included the following significant policies / strategies:
- *Water ACT*; and
 - *Think water, act water*.

Water ACT

- 2.19 *Water ACT* was a draft policy developed in July 2003. Its broad objectives related to water demand were to:
- increase the efficiency of water usage;
 - protect the water quality in ACT rivers, lakes and aquifers, to maintain and enhance environmental, amenity, recreational and designated use values and to protect the health of people in the ACT and down river;
 - facilitate the incorporation of water sensitive urban design principles into urban, commercial, and industrial development; and
 - promote and provide for community involvement and partnership in the management of the ACT Water Resources Strategy.
- 2.20 In 2003, when the draft policy was written, it was recognised that these objectives raised complex challenges. The ACT Government and the general community needed to embrace short, medium, and long-term actions that recognised supply was not the only solution. As a response, the ACT Government developed *Think water, act water* and asked the community to be '... smarter, more resourceful and more conscious of how and when we use water.'⁷

Think water act water

- 2.21 The *Think water, act water* strategy (the Strategy) is an important ACT Government policy document, guiding both the ACT Government and the community over the next 50 years. As stated in the forward:

⁷ *Think water, act water*, Volume 1, p 11.

The water resources strategy ... and accompanying implementation plan provides a framework for a partnership between the community and the ACT Government in managing, using and conserving the water resources of the region.⁸

- 2.22 Much of the focus for the first five years of *Think water, act water* was directed towards changing the practices of the residential sector, due to the large proportion of water demand generated by the sector. The Strategy notes that of the 65 GL of water used in the ACT each year, around 54 percent is used by Canberra residents in detached homes, 6 percent by residents in units, and about 10 percent by residents from Queanbeyan and other areas that access the Territory's water supply.
- 2.23 The ACT Government intended to review the Strategy every five years 'to ensure it remains current', and 'incorporates the latest thinking and new ideas'.⁹ The first review commenced in January 2010. DECCEW advised that although the first formal review started in January 2010, there has been ongoing evaluation of aspects of the Strategy, especially the action items within the Strategy.
- 2.24 The implementation plan for the Strategy was to be reviewed annually. Two progress reports have been published; the first in January 2006 covering 2004-05, and the second undated report covering the period 2005-07. As at January 2010, a third report had been drafted.

Think water, act water targets

- 2.25 In 2004, the ACT Government targets set in the Strategy were a 12 percent reduction in mains (potable) water usage per capita by 2013, and a 25 percent reduction by 2023 (compared to 2003).¹⁰ Reductions were to be achieved through water efficiency, sustainable water recycling, and use of stormwater and rainwater.
- 2.26 The targets refer to 2003 as the base year – this is actually the 2002-03 financial year. ActewAGL reports that in 2002-03, water consumption was 65.5 GL,¹¹ and the Strategy acknowledges that this was the level of consumption at the time the Strategy was published. The population was 343 440; thus the per capita water consumption was 190.9 kilolitres.¹²
- 2.27 To track achievements against the 2013 and 2023 targets, a robust assessment method is needed to ensure the data is being collected and analysed consistently.

⁸ *Think water, act water, Volume 1*, p 3.

⁹ *Think water, act water, Volume 1*, pp 3 & 8.

¹⁰ *Think water, act water, Volume 1*, p 20.

¹¹ ActewAGL website – Water facts – basic statistics, accessed 3/05/2010, <<http://www.actewagl.com.au/water/facts/statistics.aspx>>.

¹² 65.56 GL / 343,440 = 190.9 KL

Audit found that although the same target reduction (as a percentage) is quoted, several methods were used to track the progress. The reported achievements against target will vary depending on what method is used.

- 2.28 The achievements against the target may be assessed by simply measuring the consumption for a given period against that of the base year, and comparing the change to the target.
- 2.29 The Strategy provides an insight into how achievements are to be assessed:
- Weather is a predominant driver of the ACT's water consumption, so when comparing consumption over time it is necessary to correct for changes in climate. To calculate current average usage it is necessary to adjust for consumption over wet and dry years.¹³
- 2.30 The Strategy document then shows the *weather averaged* water consumption over ten years from 1992 to 2001 and an average consumption across all sectors of 174.4 KL per person per year. The use of an average across several years helps to 'smooth' the effects of weather conditions on water consumption. This was to avoid the risk, in measuring the rate of change against a single reference year, of distorting achievements if the base year chosen was a particularly dry year (in which case water use is likely to be relatively high) or a wet year (when consumption is more likely to be lower).
- 2.31 The Strategy document, in volume 2, uses the *weather averaged* water consumption of 174.4 kilolitres per person per year to calculate the 2013 target of 153 KL per person per year.
- 2.32 Audit was advised by ACTEW that the 2003 base-year method is no longer used. In 2006, a decision was made by the Senior Executive Working Group to adopt a *weather adjusted* water consumption methodology proposed by ACTEW to assess achievements against the targets. This recognises that weather is the variable that has the most impact on water consumption. Under this method, ACTEW uses historical data to estimate the water consumption in any given year, based on known weather conditions, current population estimates, and assuming no water conservation measures. The variation between actual consumption and estimated *weather adjusted* consumption provides an estimate of the savings generated through ACT Government policies.
- 2.33 ACTEW's methodology is based on nine years of calibrated data on actual and expected consumption since December 2002. However, this methodology cannot be used for forecasting, for example to predict what water consumption might be in 2013. For that, a method such as one used to estimate *weather averaged* water consumption is needed. But like any model, it will need to recognise the impact of many variables, such as future regional population growth, or the effect of

¹³ *Think water, act water, Volume 2: Explanatory Document*, April 2004, Publishing Services, Canberra, p 14.

- changes in climatic conditions; some variables are more easily defined or predictable than others.
- 2.34 There was no documentation in ACTEW or DECCEW of formal acceptance of this methodology to replace the base-year method specified in Strategy.
- 2.35 Audit has further observed that spreadsheets prepared by DECCEW as the basis for its progress reports on achievements against the Strategy's targets have used an expected annual per capita consumption rate, for each projected year from 2002-03 to 2023-24, of 217 KL. The basis for this estimated rate of consumption is not clear, and has not been adequately explained to Audit by either ACTEW or DECCEW. The estimated rate is significantly higher than the ten-year average consumption rate quoted in the Strategy (174.4 KL) – see paragraph 2.30 - or the actual consumption rate for 2002-03 (190.9 KL) – see paragraph 2.26.
- 2.36 Audit has been advised that DECCEW has recently revised the annual per capita consumption rate to correspond with the *unrestricted demand* estimated consumption rate used by ActewAGL in its Demand Modelling report; the revised rate is 182 KL per capita. Agreement has been reached, through emails between staff of DECCEW and ACTEW that the next review of the Strategy and Implementation Plan will use an estimated consumption rate of 182 KL.
- 2.37 This introduces yet another means of estimating consumption, presumably based on an estimate of consumption *if there were no temporary or permanent water consumption measures in place*.
- 2.38 DECCEW advised that:
- It is recognised that in 2003-04, there was a lack of clarity on what base year figure should be adopted. Adoption of any particular year would skew the methodology and use of a moving average also presented difficulties. At the time, an average was adopted [as] the best fit for the requirements of a new program that was setting standards for water management in Australia. The continual review of the base figure to ensure its appropriateness and on-going value as more information became available was the appropriate action, [and] ... the revision of the targets is an issue for DECCEW and ACTEW.
- 2.39 DECCEW further advised that:
- While there is no requirement under any statute or agreement, DECCEW also decided to provide an explanation of the 182 KL figure at the forward of the Progress Report (Vol 2) (on *Think water, act water*) to the Government, which is still in draft form.
- 2.40 The Progress report issued on 9 June 2010 did not include Volume 2 which includes more detail on water measures and assumptions used. Audit was advised that Volume 2 is to be released after the completion of a five year review of the *Think water, act water* strategy, that is in currently underway.

2.41 Audit considers that without a clearly defined means of measuring performance against the water savings targets, which can be measured using a consistent and robust formula, it is hard to establish whether achievements are on track and ultimately reached. As agencies are using different methods, there will be different results reported against the 2013 and 2023 water consumption targets. More importantly, these changes in methods and in baseline consumption levels should be transparent to the public so there is a clear public understanding on the reported outcomes of water saving measures.

2.42 Table 2.1 below illustrates the range of possible outcomes against the 2013 and 2023 water consumption targets using the various calculation methods observed by Audit. There were at least six different methods used to determine water consumption, of which four are shown in the table.

Table 2.1: Estimated annual water consumption: Results of different calculation methods to achieve the saving targets

	Baseline Consumption KL/person	Estimated consumption 2013 (to achieve 12% saving target) GL	Estimated consumption 2023 (to achieve 25% saving target) GL
2003 base year (from <i>Think water, act water, V1, p20</i>)	190	58 – 62 ²	52 – 62 ³
Weather adjusted (from <i>Think water, act water, V2, p15</i>)	174	53 – 56 ²	47 – 57 ³
Revised projected consumption (refer paragraph 2.36)	182	63 – 67 ⁴	66 – 80 ⁴
DECCEW projected consumption (refer paragraph 2.35)	217	76 – 80 ⁴	79 – 95 ⁴
NOTES:			
1 Based on population ranges sourced from Australian Bureau of Statistics (2008) 2013: 350,000 – 370,000 2023: 365,000 – 440,000			
2 Estimated consumption converted to GL (consumption in KL/person less 12 percent x estimated population)			
3 Estimated consumption converted to GL (consumption in KL/person less 25 percent x estimated population)			
4 Estimated consumption converted to GL (consumption in KL/person x estimated population)			

Source: ACT Auditor-General's Office

- 2.43 As shown in the table, depending on the calculation method and assumptions applied, the 25 percent reduction in water consumption targeted by 2023, could be met with an annual water consumption ranging from 57 GL to 95 GL (based on high population growth).

Recommendation 1

DECCEW, in consultation with ACTEW, should:

- clearly define the method being used to assess outcomes against the water consumption targets in the *Think water, act water* Strategy and in the Implementation Plan;
- ensure the method is robust and used consistently by all relevant agencies;
- formally approve and document any variations to the method that may occur over time; and
- provide relevant information to the public.

- 2.44 A report prepared in September 2007 titled *Demand Management Past Present and Future*¹⁴ looked at the estimated savings for the demand management measures. The report examined the effect of the then existing water efficiency programs, and estimates of water savings achieved to June 2007. The report noted:

The target for 2013 has already been largely exceeded. Major savings achieved during this period are estimated to have been delivered by the introduction of Permanent Water Conservation Measures and associated information and awareness campaigns. Temporary water restrictions have also contributed significantly to meeting the 2013 target.¹⁵

- 2.45 ACT's annual water consumption for 2008-09 was just under 45 GL. As at May 2010, the annual water consumption for 2009-10 was approximately 41 GL. These annual water consumption figures are below the 2013 GL targets of between 56 to 80 GL (depending on which method is used), indicating that the ACT should meet the 2013 target.

Governance framework

- 2.46 Since 2004, there were various changes in the governance arrangements for water management, in particular, for the implementation of the Government key strategy *Think water, act water*. The work on the Strategy started with the then

¹⁴ Prepared by the Sustainability Policy and Programs, Department of Territory and Municipal Services and the Water Security Taskforce, Chief Minister's Department, Canberra.

¹⁵ *Demand Management Past Present and Future*, prepared by the Sustainability Policy and Programs Department of Territory and Municipal Services and the Water Security Taskforce Chief Minister's Department, Canberra, p 4.

Department of Urban Services, and the policy function was transferred to Treasury. The program work undertaken by ACTEW was also moved to the Department of Urban Services. When TAMS was formed, it continued to manage the programs under the Strategy. The responsibilities then moved to CMD as part of the Office of Sustainability, with Treasury holding the policy function. The areas were combined in CMD before being split again between TAMS and CMD and then combined again under TAMS, and more recently moving to the newly created DECCEW.

- 2.47 Water governance and regulation is now shared by several agencies under a broad overarching governance framework:
- ACTEW provides energy, water and wastewater services to the ACT through the ActewAGL joint venture. ACTEW has ownership of the water and wastewater assets, and the operation and management of these assets is contracted to ActewAGL. ACTEW also manages water restrictions and pricing regimes, as approved by the ICRC, on behalf of the ACT Government, and undertakes education and awareness programs in consultation with the ACT Government.
 - DECCEW is responsible for water policy and a range of demand management programs, as well as education and awareness programs (this was formerly a function of TAMS).
 - CMD, through the Policy Division, provides overall ACT Government policy, including (at times) matters relevant to water management;
 - Treasury advises on relevant financial issues, including the water abstraction charge imposed on ACTEW.
- 2.48 Overall coordination for water governance and regulation is through the Chief Executives Water Group (CEWG), which comprises the Chief Executives of CMD, DECCEW, Treasury, and ACTPLA, the ACT Chief Health Officer, and the Managing Director of ACTEW. The CEWG oversees and directs the ongoing consideration of water-related issues, including supply options. It is charged with ensuring coordinated, consistent, and regular advice is provided to the ACT Government, and that non ACT Government stakeholders are provided with consistent views in line with ACT Government policy.
- 2.49 A Senior Executives Water Group (SEWG) supports the CEWG, and uses working groups to instigate ideas and develop projects.
- 2.50 Audit noted that minutes of a SEWG meeting in March 2008 highlighted uncertainty about roles and responsibilities in water communications, given the various parties involved. Since November 2008, there has been greater certainty and direction as most of the functions and programs are centred in DECCEW.

2.51 Improved clarity in the roles and responsibilities in water management would assist accountability for the success or otherwise of various water initiatives.

2.52 DECCEW advised that:

The amalgamation of programs and policy under one agency (originally TAMS and now DECCEW) has reduced the need for cross agency coordination. The use of all available communications methods including email and phone has further reduced the need for formal meetings whilst ensuring improved coordination. Further advances have been made by the use of specialised working groups to manage issues e.g. the Permanent Water Conservation Measures Working Group.

Modelling for water demand

2.53 Modelling has been used at many levels to assist in managing water requirements for the ACT region. Many of the ACT region's water consumption characteristics are quite different to those of other capital cities because:

- there is negligible industrial water use and a high proportion of outdoor use (both domestic and non-domestic) due to relatively large block sizes and large amounts of open space;
- the region suffers long dry spells compared to coastal cities;
- there are high evaporation rates due to lower humidity arising from the inland location; and
- the region features shallow topsoils compared with coastal plains.

2.54 Water modelling involves assumptions made by the modellers. The modelling and assumptions appear comprehensive. Review of the water demand models for the ACT region and underlying assumptions have been performed annually since 2004. The annual reviews are important as they provide the opportunity to adjust the model (if needed) for changes in conditions not previously considered, or which have varied significantly, such as the unprecedented low water inflows for the ACT region.

2.55 The demand model takes into account ACT Government measures and policies, including:

- education and advertising;
- Permanent Water Conservation Measures;
- effluence reuse;
- stormwater harvesting;
- rainwater tanks and greywater reuse;
- water efficient appliances and fittings;
- leakage reduction;

- ACT Government's subsidised indoor and outdoor water tune-ups;
- required new developments to achieve a 40 percent reduction in water use through water sensitive urban design;
- water restrictions; and
- ongoing pricing reforms.¹⁶

2.56 These ACT Government measures are included in *Think water, act water* and some of them are the initiatives selected for review in this audit. The water modelling analysis is a positive process.

2.57 Chapter 4 of this report further discusses some of the assumptions for specific initiatives, and shows that the assumptions for water savings may be overstated. This is likely to impact the effectiveness of the model.

CONCLUSION

2.58 The region's water resources must be carefully managed. Supply in recent years has been low, reflecting drought conditions. Although construction of an enlarged Cotter Dam should improve the supply situation, it is almost certain that demand management will continue to be required to manage water consumption as the region's population grows.

2.59 The ACT Government strategy *Think water, act water* sets a water management framework and establishes long-term water saving targets. However, the targets and the methodology to assess achievements against them need to be clearly defined for consistency and clarity across all agencies. This will assist in monitoring and reporting progress and disseminating consistent information to the community.

2.60 The ACT Government intended to review *Think water, act water* every five years, and the implementation plan annually. The first review of the Strategy commenced in January 2010. Progress reports have been less frequent than intended. At the time of this audit only two (instead of the intended six) progress reports have been published since 2004; the first in January 2006 covering 2004-05, and the second undated report covering the period 2005-07. Since the audit, a third progress report covering 2007-08 and 2008-09 was released on 9 June 2010.

2.61 Water demand modelling has been regularly reviewed to reflect the significant changes to Canberra water situation.

¹⁶ *Water Planning 2009 Review of Planning Variables for Water Supply and Demand Assessment. A review of the changes in water resources modelling assumptions July 2009.* Infrastructure Development Branch Water Division, Canberra, Page 7.

3. PERMANENT WATER CONSERVATION MEASURES AND TEMPORARY WATER RESTRICTIONS

INTRODUCTION

- 3.1 Canberra has been in some stage of water restriction or permanent water conservation since November 2002. Permanent Water Conservation Measures are designed to lock in behavioural changes with the intention of securing a permanent saving in water. Permanent Water Conservation Measures were forecast to have the largest impact on demand for ACT potable water, and were seen as necessary to achieve the target savings in 2013 and 2023 in *Think water, act water*.¹⁷
- 3.2 In contrast, Temporary Water Restrictions are intended to achieve short-term reductions in water demand, in response to drought or other emergencies. Temporary restrictions are introduced when Permanent Water Conservation Measures have not been sufficient to conserve water at the rate required.
- 3.3 ACTEW has responsibility for developing the schemes for water conservation measures and temporary restrictions for Ministerial approval. ACTEW then makes decisions and manages the water conservation measures within the approved Schemes.
- 3.4 This chapter examines the governance framework for water conservation measures and restrictions, the implementation and management of the measures, and their effectiveness.

KEY FINDINGS

- ACTEW and its Water Conservation Office managed the level of restrictions and related community issues well. Within the Schemes, approved by the Minister, ACTEW made decisions on Temporary Water Restrictions and Permanent Water Conservation Measures based on many factors including varied community views, predicted weather forecast, dam storage levels, Canberra's current and expected water consumption and catchment inflows.
- Under the *Utilities (Water Conservation) Regulation 2006*, ACTEW is required to work in consultation with the Environment Protection Authority to develop the Permanent Water Conservation Measures and Temporary Water Restrictions. However, there was little effective consultation for the last decisions taken in 2006 regarding water restrictions. A failure to adequately consult could result in a higher risk that a recommendation made by ACTEW and supported by the Minister lacked appropriate whole-of-government input. Since November 2008,

¹⁷ Potable water is defined as water within the health and aesthetic values supplied in accordance with the Drinking Water Quality Code of Practice made under the Public Health Act 1997.

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there has been better communication on water issues as the water policy, functions and programs are now centred in the new Department, DECCEW.

- Agencies used different and changing methods and assumptions to measure water consumption targets, using base consumption levels ranging from 174 KL to 217 KL per person to calculate water savings against targets. This could lead to a lack of consistency and clarity in reporting results of water savings to the ACT Government and to the public. DECCEW recently advised that agreement has been reached to use 182 KL as the base consumption level.
- Care should be taken around reporting of water savings to the public, to ensure savings are not overstated. Currently, ACTEW adopts a water consumption level assuming no water restrictions in place as a baseline, and calculates water savings against this baseline number. This approach has the potential to overstate achievements in water savings over time, and may not adequately recognise and communicate to the ACT community the increasing challenge of delivering further savings on top of those already achieved from the Permanent Water Conservation Measures.
- Storage levels in the ACT's dams are used by ACTEW as one of the factors to trigger the possible introduction or variation of water restrictions. There was no consistent correlation between the restriction level indicated by dam storage levels and the actual restrictions in place. This suggests that dam storage levels have far less significance in determining water restriction levels than other factors. It would enhance the transparency if all the factors used by ACTEW in its decision making process, and the relative 'weighting' of these factors, were made readily available to the public.
- ACTEW ran extensive and effective community education and awareness campaigns. ACTEW's involvement with the community to increase awareness has played a major part in the success of the water restrictions.

BACKGROUND

3.5 The *Think water, act water* strategy notes that prior to the introduction of water restrictions and Permanent Water Conservation Measures, Canberra's water consumption was 65 GL¹⁸ per year. Since November 2002, when some form of restrictions have been in place, water consumption has decreased considerably. Data from the ActewAGL website, shows that over the six years from 2003-04 to 2008-09, average yearly consumption has dropped to 49.6 GL.¹⁹

3.6 Figure 3.1 illustrates water consumption since 1999-2000. Introduction of water conservation measures in 2002 brought about an obvious decrease in

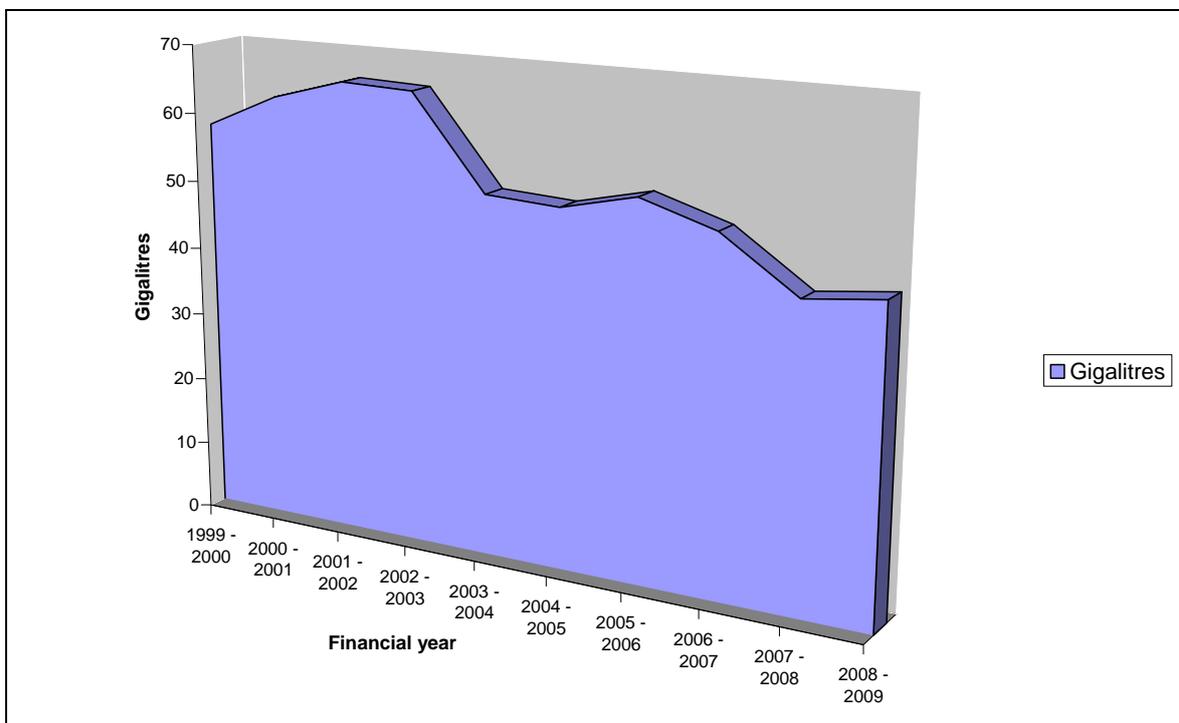
¹⁸ *Think water, act water Volume 1*, p 20.

¹⁹ ActewAGL website – Water facts – Total annual consumption, accessed 17/05/10, <<http://www.actewagl.com.au/water/facts/annualConsumption.aspx>>.

consumption. The imposition of Stage 3 restrictions in December 2006 saw a significant further decrease.

- 3.7 On the face of it, the reduction in water consumption indicates water restrictions are effective. However, other factors, such as weather conditions and pricing, also contribute to changes in water consumption. Pricing is not within the scope of this audit; however, it is discussed briefly below to show the significant changes to pricing in recent years, which may also have contributed to reductions in water consumption.

Figure 3.1: Canberra's water consumption (from 1999-2000 to 2008-2009)



Source: ACT Auditor-General's Office, based on ActewAGL website – Water facts – Total annual consumption.

Pricing

- 3.8 The Independent Competition and Regulatory Commission (ICRC) of the ACT sets the price of ACT water. Pricing structures include a fixed price plus a tiered variable cost, such that users pay higher rates according to their level of use. The current fixed charge is \$89.55. Tier 1 covers consumption up to 200 KL (\$1.85 per KL) and Tier 2 covers 201 KL and above (\$3.90 per KL).
- 3.9 The ICRC also introduced daily pricing as proposed by ACTEW, effective from 2008-09. For the first 0.548 KL supplied on average per day of the billing period,

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\$1.95 is charged. All the water supplied in excess of 0.548 KL²⁰ on average per day of the billing period is charged at \$3.90 per kilolitre. These charges are added to the flat rate of \$89.55 for all parcels of land (properties).

- 3.10 Table 3.1 illustrates the pricing structure, and the cost for an average household (detached houses) water bill, based on advice from the Water Conservation Office that Canberra's average annual water consumption for a household is 250 kilolitres). Audit calculations under the daily charging arrangements assume an average daily consumption of 0.685 KL per day (average annual consumption of 250 KL per year divided by 365 days).
- 3.11 The costs of water to consumers include the water abstraction charges and the Utility Network charges which are imposed on ACTEW, and passed on to the consumers.
- 3.12 The pricing of water and wastewater services can impact on the demand for water, for example, by offering an additional incentive to save water in areas not currently captured by behavioural water restrictions. The actual impact, however, is difficult to assess as there is a strong dependency on water, and the community has broad expectations regarding its general availability for use. Nevertheless, the impact of the substantial increase in average household water costs over recent years cannot be excluded as a significant factor in the reduction in the region's water consumption, over and above that induced by water restrictions.

²⁰ This is an average daily use based on the 200KL upper limit of Tier 1 of the pricing structure:
i.e. $200 \text{ KL} \div 365 \text{ days} = 0.548 \text{ KL per day}$.

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Table 3.1: ACT water prices from 2004-05

Water	2004-05	2005-06	2006-07	2007-08	2008-09 to 2012-13*	2009-10 Daily charging
Fixed \$ per year	75	75	75	75	85	89.55
Water Abstraction Charge and Utility Network Facilities Tax \$ per KL	0.2	0.25	0.55	0.64	0	0
Tier 1 (0-100 KL) \$ per KL	0.515	0.58	0.66	0.775		
Tier 1 (0-200 KL) \$ per KL					1.85	1.95
Tier 2 (101-300 KL) \$ per KL	1.00	1.135	1.29	1.67		
Tier 2 (201 KL +) \$ per KL					3.70	3.90
Tier 3 (301 KL +) \$ per KL	1.35	1.53	1.74	2.57	N/A	N/A
Average household water bill (based on 250 KL per year)	\$326.50	\$365.75	\$427.00	\$563.00	\$640.00	\$674.61

Source: ICRC Report 1/2008 *Water and Wastewater Price Review: Final Report and Price Determination*, p 127 and 136
* From 2009-10 to 2012-13 there will be an annual increase of CPI+ 1%.

GOVERNANCE

- 3.13 The Schemes for Permanent Water Conservation Measures and Temporary Water Restrictions are developed by ACTEW. Both these schemes are approved by the Minister. Within the approved schemes, ACTEW makes the decisions on which stage of restrictions are imposed. When ACTEW considers that a new stage of restriction or an extension of the existing stage of restriction is required, ACTEW informs the Minister. Temporary or permanent water restrictions have been varied many times between 2002 and 2010.
- 3.14 Governance for Temporary Water Restrictions and Permanent Water Conservation Measures is established in legislation; namely the *Utilities (Water Conservation) Regulation 2006* under the *Utilities Act 2000*.
- 3.15 Within the Temporary Water Restriction Scheme, that has been approved by the Minister, ACTEW (as the utility) proposes the stage of water restriction, consults with the Environment Protection Authority (EPA), and notifies the Minister of the

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proposal. Once these processes are complete, the information is made available to the public.

- 3.16 At a whole-of-government level, reviews of Permanent Water Conservation Measures and restrictions were approved by Chief Executive Water Group and Senior Executive Water Group.

Consultation with the Environment Protection Authority

- 3.17 Under the *Utilities (Water Conservation) Regulations 2006* the Minister may approve a Temporary Water Restrictions Scheme or Permanent Water Conservation Measures Scheme if satisfied that ACTEW has ‘developed the measures in consultation with the Environment Protection Authority’ (EPA).

- 3.18 Once a scheme has been approved by the Minister, the decision to implement Stages of water restrictions within the Scheme rest with ACTEW.

- 3.19 Procedures developed by ACTEW require consultation with the EPA, and relevant documentation to be included with the recommendation regarding conservation measures submitted to the Managing Director of ACTEW for consideration. Any comments provided by the EPA are to be considered. ACTEW’s notification to the Minister noted that ACTEW ‘has consulted with the Environmental Protection Authority on the proposed declaration as provided for under the regulations.’

- 3.20 Documentation reviewed by Audit indicated that ACTEW did not properly consult with EPA. For example, a timeline in the ACTEW procedures shows that the EPA should be *notified* (rather than *consulted*) of proposed measures a week before the Managing Director and the Minister, and three weeks before the proposed commencement of the measure, but this did not happen for past ACTEW decisions.

- 3.21 For example, for an extension of Permanent Water Conservation Measures on 16 January 2006, the EPA was notified, at the same time as the Minister, of ACTEW’s intention to introduce water restrictions. No documentation of prior consultation could be located, nor was ACTEW able to provide a formal response to a specific EPA comment provided on 20 September 2005. ACTEW advised Audit that ‘it is likely [EPA’s] response was subsequently discussed verbally.’ Audit notes that ACTEW was last required to formally consult with EPA prior to the change to Stage 3 restrictions in December 2006.

- 3.22 Consultation with relevant bodies in implementing important policies, through measures that have significant implication for the community (such as water restrictions), is important in ensuring decisions are appropriate from a whole-of-government perspective. Effective consultation requires that the party being consulted has an opportunity to make comment and provide input to a decision, before the decision is made. ACTEW’s procedures, as described above

appear to provide that opportunity. Its practice, however, has been deficient; advising the EPA of intended restrictions at the same time the Minister is advised falls short of consultation, and it would seem inappropriate to describe this practice to the Minister as '[having] consulted with the EPA'.

- 3.23 Audit was advised that since the formation of DECCEW in 2008 which includes the EPA, ACTEW and DECCEW have strong communication links, and that both are active participants in the Chief Executives Water Group (CEWG) and the Senior Executive Water Group (SEWG), which discusses all water issues, including water restrictions.

Recommendation 2

ACTEW should consult appropriately with the Environment Protection Authority (EPA) on any proposals or decisions on Temporary Water Restrictions or Permanent Water Conservation Measures.

Recommendation 3

ACTEW should update its procedures to reflect a consultative approach as required by the *Utilities (Water Conservation) Regulations 2006*. All consultation should be documented.

Water restrictions

- 3.24 Specific areas of use are targeted for water restrictions for Permanent Water Conservation Measures and Temporary Water Restrictions. The constraints on each usage can be varied according to the level of the restriction. For example:
- private gardens and lawns – under Permanent Water Conservation Measures, sprinkler or irrigation systems may be used on any day between 6 pm and 9 am, but under Stage 3 Temporary Water Restrictions, watering lawns is not permitted at any time;
 - vehicles - under Permanent Water Conservation Measures, vehicles may be washed on a lawn (if not washed at a commercial car wash), with a bucket, using a hand-held hose with a trigger nozzle. Under Stage 3 Temporary Water Restrictions, vehicles may not be washed except at a commercial car wash that recycles water and holds an exemption for use of potable water.
- 3.25 A full comparison of the restrictions of water use is included at Appendix D: Comparison of stages of water restrictions.

OBJECTIVES, METHODS AND IMPACT

Permanent Water Conservation Measures

Objectives

3.26 The overall objective of Permanent Water Conservation Measures was to achieve a permanent reduction in potable water consumption.

3.27 The Permanent Water Conservation Measures target was to reduce water consumption by an average of eight percent per capita. ACTEW used a seasonally adjusted target as the basis for the eight percent water reduction. Seasons have been the basis of adjustment because twice as much water has historically been used in summer compared to winter usage. Autumn and spring use is about half way between the summer and winter consumption.

Method

3.28 Reflecting the differences in seasonal water usage in the Canberra region, the targets to reduce consumption are ten percent in summer, five percent in winter and eight percent in spring and autumn. ACTEW uses these monthly seasonally adjusted targets to inform the public of daily targets and monitor against the actual water consumption. Table 3.2 below shows the average consumption and monthly targets in megalitres per day (ML/day) applied since 2006.

Table 3.2: Average monthly overall percentage reductions and published targets

Month	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Over all
Average Consumption (ML/day)	127	125	130	141	167	202	250	262	245	210	171	143	181
Monthly Consumption Target (ML/day)	120	118	123	133	155	185	225	236	221	191	158	134	167
Monthly Saving Target (%)	5%	5%	5%	6%	7%	9%	10%	10%	10%	9%	8%	6%	8%
Seasonal Consumption Target (ML/day)	Winter 121			Spring 158			Summer 228			Autumn 158			
Seasonal Saving Target (%)	5%			8%			10%			8%			

Source: ACTEW

Permanent Water Conservation Measures and Temporary Water Restrictions

- 3.29 Permanent Water Conservation Measures were introduced in the ACT in 31 March 2006 after a trial known as Water Conservation Measures, which began five months earlier (1 November 2005). Permanent Water Conservation Measures remained in place until 1 November 2006 when they were replaced with Stage 2 Temporary Water Restrictions.
- 3.30 The primary objective of Permanent Water Conservation Measures is to achieve a permanent reduction in potable water consumption. This objective was to be achieved by:
- implementing a set of measures that are reasonable and easy to follow, but do not cause hardship on the community;
 - managing the program effectively to ensure a high level of compliance and community cooperation;
 - creating behavioural change in the areas targeted by Permanent Water Conservation Measures, as well as other areas where water savings can be made easily, by actively working to raise awareness, educate and motivate residents and businesses.
- 3.31 Permanent Water Conservation Measures were reviewed by ACTEW between September 2008 and June 2009. The review considered the effectiveness of the current scheme and assessed other areas for improving water reduction. A proposal for an updated Permanent Water Conservation Measures was subsequently given to the ACT Government on 29 June 2009. However, at June 2010, the ACT Government has not yet finalised its response to the proposal.

Impact of Permanent Water Conservation Measures

- 3.32 At the time Permanent Water Conservation Measures were in place (from November 2005 to October 2006) there was a 22 percent reduction in water use per capita if measured against 'Expected Consumption', and a 16 percent reduction if measured against 'Average Consumption (historic)'. It is not possible to determine how much of these savings results directly from Permanent Water Conservation Measures or other factors such as pricing or residential water saving initiatives. (Discussion of Expected and Average consumption can be found in paragraph 3.62.) Both these reduction percentages exceed the eight percent target, indicating that the Permanent Water Conservation Measures achieved the target reduction in the consumption of potable water.
- 3.33 ACTEW advises that the consumption reductions (16 percent and 22 percent) for Permanent Water Conservation Measures were achieved after an extended period of Temporary Water Restrictions. It is likely that consumption practices learnt during the water restriction period continued into the Permanent Water Conservation Measures period. Therefore, it is unlikely that Permanent Water Conservation Measures could deliver reductions of this magnitude in the long term, once consumption practices return to normal.

Temporary Water Restrictions

Objectives

- 3.34 The overall objective of Temporary Water Restrictions is to allow ACTEW to continue to provide a supply of potable water.
- 3.35 ACTEW may introduce Temporary Water Restrictions when ACTEW considers that more water needs to be conserved than was being achieved through the Permanent Water Conservation Measures.
- 3.36 Prior to Permanent Water Conservation Measures, the water saving rate is calculated on the consumption with no restrictions. Because Permanent Water Conservation Measures savings targets were seasonally adjusted averages, the intended savings of each water restriction stage are savings over and above the seasonal percentage of Permanent Water Conservation Measures.

Method

- 3.37 There are currently four stages of Temporary Water Restrictions. The Temporary Water Restriction targets are added to the Permanent Water Conservation Measure target resulting in each month having a different water saving target. (See Table 3.2 for the Permanent Water Conservation Measure targets.) These targets are seasonal as summer water usage is almost twice that of winter in the Canberra region. So the Permanent Water Conservation target of five percent in winter and 10 percent in summer is added to the Temporary Water Restriction target. For example, a Stage 1 target of 10 percent becomes 14.5 percent in winter and 19.0 percent in summer. Each month in autumn and spring also has a different savings target.
- 3.38 ACTEW monitors Canberra's daily water consumption against the seasonal daily targets, along with predicted consumption, dam storage levels, rainfall and inflows, predicted weather conditions and restrictions in other Australian cities, to assess the level of restrictions that Canberra needs to ensure continuing water availability.
- 3.39 The Temporary Water Restrictions scheme was reviewed four times since its introduction on 16 December 2002. The reviews occurred in 2003, 2005, 2006 and 2009. The 2009 review was still in draft form during this audit (March 2010). With each review, the restrictions requirements increased for each stage. Therefore, the old Stage 1 restrictions are approximately the current Permanent Water Conservation Measures and the old Stage 2 restrictions are approximately the current Stage 1 restrictions.
- 3.40 For the purposes of the audit analysis of the effects of the stages of restrictions, all stages have been converted to the current Stage equivalents.

Impact of Temporary Water Restrictions

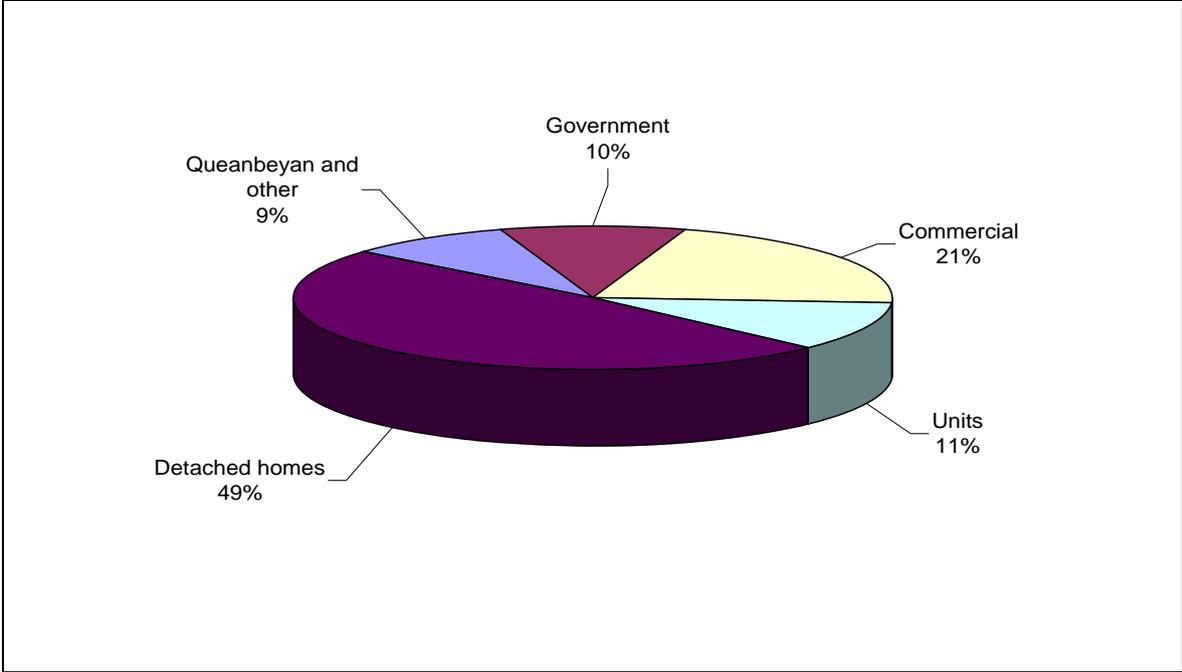
- 3.41 Total water use for the Canberra region in the 2007-08 financial year was 43.5 GL and in 2008-09 was 44.9 GL.²¹ This represents a reduction of 33 percent and 31 percent respectively from the 2002-03 consumption for the region of 65 GL each year. The historical consumption level of 65 GL a year, if adjusted for increased population, would be 71.6 GL a year, and this would increase the reported consumption reduction.
- 3.42 Analysis of Canberra consumption data supplied by ACTEW showed a 39 percent reduction when Stage 3 water consumption was compared to 'Expected Consumption' and 38 percent reduction when compared to 'Average Consumption'.
- 3.43 These water savings are significant, and come close to reaching the intended savings.

Who uses Canberra water?

- 3.44 The impact of restrictions and Permanent Water Conservation Measures can also be seen by looking at who uses Canberra water. Canberra water consumption comprises of five user groups:
- detached houses;
 - units;
 - commercial users;
 - government users (includes the irrigation of parks, playing fields and school grounds); and
 - Queanbeyan and other users.
- 3.45 Figure 3.2 illustrates the relative water consumption of these user groups for 2007-08 (total annual water consumption was 43.5 GL).

²¹ ActewAGL facts and figures information on total annual consumption by financial year. <<http://www.actewagl.com.au>>.

Figure 3.2: Canberra’s water use breakdown for 2007-08



Source: ACTEW.

- 3.46 *Think water, act water* published information showing a breakdown of water use prior to 2004²² and noted that water consumption for 2002-03 was 65.5 GL. Table 3.3 shows a comparison of water consumption by user groups.
- 3.47 The residential sector has been a strong focus for the first five years of *Think water, act water*. Table 3.3 shows there has been a significant shift since 2002-03 in water use for detached homes, both as a percentage of total consumption and in absolute terms. Consumption by the residential sector remains at around 60 percent of total consumption, but the quantity of water used in the sector overall decreased in the order of 33 percent.

²² *Think water, act water, Volume 1, p 22.*

Permanent Water Conservation Measures and Temporary Water Restrictions

Table 3.3: Comparison of water consumption: 2002-03 and 2007-08

User group	2002-03 Consumption %	2002-03 Consumption GL	2007-08 Consumption %	2007-08 Consumption GL
Detached homes	54	35.4	49	21.3
Units	6	3.9	11	4.8
<i>Sub-total</i>	60	39.3	60	26.1
Commercial	19	12.5	21	9.1
Government	11	7.2	10	4.4
Queanbeyan and other	10	6.5	9	3.9
<i>Sub-total</i>	40	26.2	40	17.4
Total water consumption	100	65.5	100	43.5

Source: ACT Auditor-General's Office from ACTEW and ActewAGL data.

SELECTING STAGES OF RESTRICTIONS

3.48 ACTEW selected the level of restrictions taking many factors into consideration. ACTEW was aware of the impacts to the community and business, of introducing and lifting the selected level of restriction.

3.49 The factors taken into account by ACTEW to determine which stage of restrictions to introduce, included:

- dam storage levels;
- the time of the year and likely consumption of water;
- daily consumption levels in the immediately preceding period;
- daily consumption levels in corresponding periods in previous years;
- currently available weather forecasts and other meteorological advice;
- the desirability of reducing water usage on an ongoing basis;
- the desirability of avoiding excessive reliance on only one of the ACT's water catchments;
- avoiding excessive changes between stages; and
- the impact to businesses.

3.50 Audit noted that comprehensive documentation and data were provided to the ACTEW Managing Director to support a recommendation regarding water restrictions. For example, documentation to support a recommendation to introduce Stage 3 restrictions in November 2006 noted that (among other things):

Permanent Water Conservation Measures and Temporary Water Restrictions

- over the previous seven years (except for 2005) the ACT had not received the expected median rainfall;
 - the inflows to catchments had been at record low levels;
 - dwindling inflows were reflected in the November 2006 storages being the lowest they have been at that time of year (43.1 percent), and 24 percent lower than the same time in the previous year; and
 - a recommendation had been made to reduce environmental flows from the Cotter reservoir from 15 ML per day to 5 ML per day, effective from December 2006.
- 3.51 The community impacts of introducing Stage 3 at particular dates and predicted dates for the later introduction of Stage 4 was also canvassed in the documentation, which was supported by discussion, data, and graphs.
- 3.52 The Chief Executive Water Group is not part of the formal process for approval of water restrictions, although updates of dam storage levels and Canberra's water consumption compared to daily targets were given by ACTEW to each meeting of the Chief Executive Water Group and the Senior Executive Water Group. DECCEW further advised that water restrictions are an important regular item on the CEWG meeting agenda.
- 3.53 Stage 3 restrictions have been in place since 16 December 2006. The selection and introduction of water restrictions has resulted in water savings of up to 20 GL per year (based on an average consumption of 65.5 GL and a 2007-08 consumption of 43.5 GL). It is clear that the various water restrictions have helped significantly in avoiding serious water shortages.

ADMINISTRATION OF WATER RESTRICTIONS

- 3.54 Permanent Water Conservation Measures and Temporary Water Restrictions were administered on a daily basis by the Water Conservation Office (WCO), a division within ACTEW. Tasks the WCO staff performed in relation to Permanent Water Conservation Measures and Temporary Water Restrictions included:
- answering calls from the public, responding to queries relating to water restrictions, exemptions, users not adhering to the current restriction requirements and other general inquiries;
 - working with 'large users', businesses and organisations, to develop water reduction targets;
 - visiting locations where misuse of water had been reported;
 - managing adherence to restrictions through issuing exemptions, warnings, and fines (in cases of non-compliance by a member of the public this may result in court prosecution);

Permanent Water Conservation Measures and Temporary Water Restrictions

- running *waterwise* gardening workshops for the public to provide helpful tips on achieving better gardens with less water;
 - reporting to the Managing Director of ACTEW on a weekly basis;
 - reviewing Temporary Water Restrictions and Permanent Water Conservation Measures; and
 - making recommendations to the Managing Director of ACTEW on changes to the stage of water restrictions, or temporary relief programs.
- 3.55 Policies and procedures for the roles within the WCO were well documented and training manuals for authorised persons and field officers were available, as well as a comprehensive WCO database.
- 3.56 Audit reviewed files and observed work practices of the WCO that indicated these roles are being carried out appropriately.
- 3.57 ACTEW also has a Corporate Communication division. Tasks the Corporate Communication division staff performed related to Permanent Water Conservation Measures and Temporary Water Restrictions included:
- developing and managing communication strategies for Temporary Water Restrictions and Permanent Water Conservation Measures, including stakeholder communication methods, media releases, newspaper ads and liftouts;
 - working with ACT Government agencies to ensure consistent information is provided to the public on water saving initiatives;
 - reviewing Temporary Water Restrictions and Permanent Water Conservation Measures; and
 - providing recommendations to the ACTEW Managing Director on changes to stages of water restrictions.
- 3.58 Audit reviewed various reports evaluating the effectiveness of communication strategies, a report on continuation of Permanent Water Conservation Measures, cost-benefit analysis of Permanent Water Conservation Measures and Temporary Water Restrictions, publications to inform the public of restrictions, and media articles and advertisements. These items were sound and fit-for-purpose.

Administrative cost of water restrictions

- 3.59 The main costs of managing the water restrictions are the WCO and Corporate Communications staff salaries and program expenses. From 2003-04 to 2008-09 the average costs associated with the Water Conservation Office were approximately \$1.5 million per year, of which \$700 000 was for communications. Table 3.4 summarises the administrative expenses.

Permanent Water Conservation Measures and Temporary Water Restrictions

- 3.60 The introduction of more restrictive water conservation measures, such as the Stage 3 restrictions in December 2006, increases administrative costs. This reflects the additional communication and marketing efforts required to alert the community, and additional staff to support, monitor, and police the restrictions.
- 3.61 Administrative costs are passed on to the community as a component of the water price paid by consumers.

Table 3.4: Summary of administrative costs of water restrictions

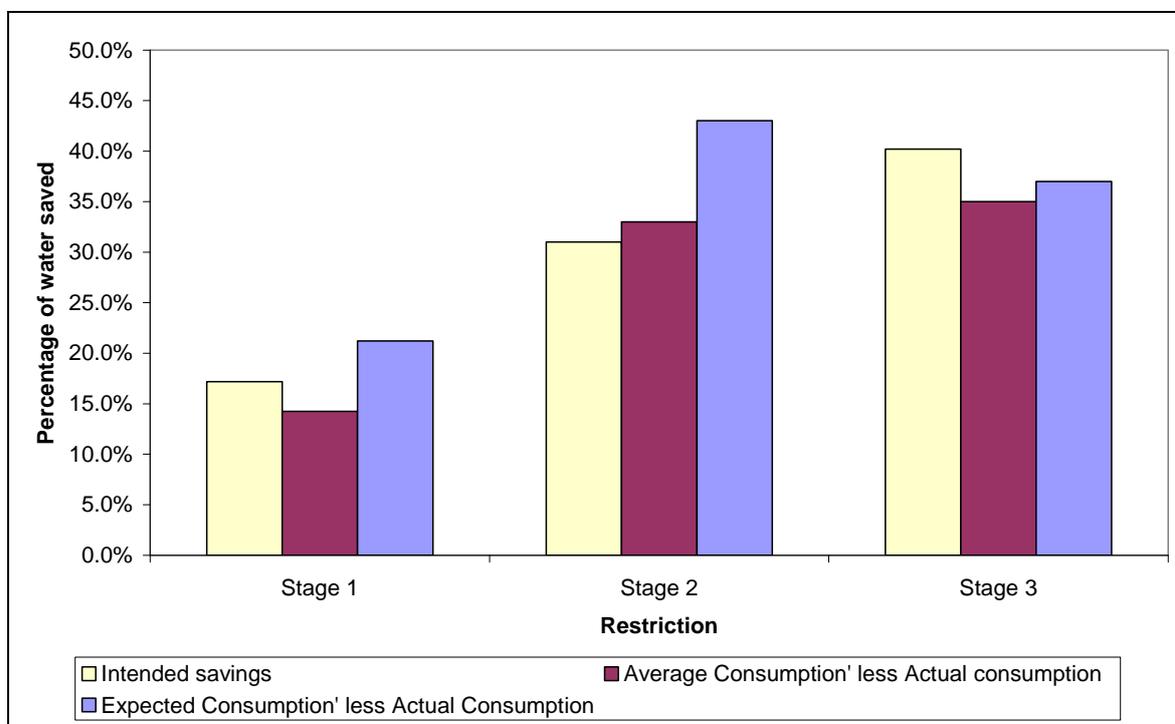
Expenses	2003-04 \$	2004-05 \$	2005-06 \$	2006-07 \$	2007-08 \$	2008-09 \$
Employment	442 001	498 554	392 602	548 011	862 806	832 532
Communication and marketing	653 980	773 459	732 168	836 523	688 572	685 791
Other operating	122 681	117 908	110 381	246 153	235 105	296 552
Total expenses	1 218 662	1 389 921	1 235 152	1 630 688	1 786 483	1 814 875

Source: ACTEW's Finance Division.

REPORTING WATER SAVINGS

- 3.62 ACTEW reports water savings to the public as an indicator of progress being made through water restrictions or Permanent Water Conservation Measures. The reported water savings is based on a predicted figure called 'Expected Consumption', which is based on water use that would have occurred if no water restrictions were in place.
- 3.63 ACTEW also uses a measurement known as 'Average Consumption'. This is an historic average amended to reflect population growth and current water use trends. Expected Consumption is almost always larger than Average Consumption.
- 3.64 The different comparative bases will yield different savings against consumption targets, as seen in Figure 3.3, which compares the reported savings (for example against Expected Consumption), Average Consumption savings and the intended savings for each stage of restriction. The 'intended savings' reflect the savings target shown in Table 3.2 (for comparative purposes, an average of the winter and summer targets has been used).

Figure 3.3: Comparison of reported water savings against ‘expected’ and ‘average’ consumption to intended savings



Source: ACT Auditor-General's Office analysis of ACTEW data.

3.65 ACTEW explains the use of Expected Consumption as follows:

Expected Consumption is a measure of what the ACT Consumption would have been, had water restrictions not been in place. It is calculated using a model that predicts consumption on the basis of the weather (rainfall and evaporation). The model has been calibrated with data from before the introduction of restrictions, so it represents the underlying consumption patterns for Canberra before restrictions. Expected consumption is adjusted for population, so the Expected Population figures include allowance for increase in demand due to population.

ACTEW does not favour any system that uses averages as a basis for comparison. The key drivers of water consumption in the ACT are evaporation and rainfall, and averages simply mask the rainfall signal in consumption so are never used by ACTEW as a baseline. The expected consumption in recent years is higher than the average consumption because recent years have been hotter and drier than the average. It is necessary to include this climate factor when calculating the amount of water saved during water restrictions.

3.66 The savings against Expected Consumption can be used to measure savings against the *Think water, act water* targets for demand reduction. This measure demonstrates the reduction in consumption brought about by changes the community has made in response to permanent water conservation measures, restrictions, and other initiatives under *Think water, act water*.

Permanent Water Conservation Measures and Temporary Water Restrictions

- 3.67 Whether Expected Consumption is the best means of measuring (and reporting) savings from additional measures or water restrictions is less clear. As some form of water restrictions has been in place now for over seven years, and is likely to continue, it seems unrealistic to continue to measure consumption against a consumption level based on no restrictions being in place.
- 3.68 Further, community attitudes to water use have changed, as can be seen by the significant decrease in consumption, and further water savings are likely to be harder to obtain from a new low base of consumption. This suggests that a measure of savings that reflects the new baseline – that is, a level of consumption that has regard for the Permanent Water Conservation Measures, and the savings achieved – would offer a more meaningful report to the community regarding the outcomes of water savings initiatives.

Recommendation 4

For future reporting, ACTEW should consider the measurement of water savings against a new consumption baseline that does not include the savings already achieved from the Permanent Water Conservation Measures. In the interim period, ACTEW should make it clear to the community that the savings are a combined result from Temporary Water Restrictions and the ACT Government's demand management program.

Dam trigger levels

- 3.69 ACTEW informs the public on a daily basis of dam storage levels. This is done using road sign displays and the ACTEW website. The storage levels reported are the average storage levels of Corin, Bendora, Cotter, and Googong dams.
- 3.70 ACTEW uses 'dam trigger levels' as one of the factors in determining the stage of restrictions for the Canberra region. 'Dam trigger levels' are selected percentages applied to the dam storage levels and used by ACTEW as a guide for commencing discussion on introducing or lifting a given Stage of water restrictions. For example, if storage levels were at 52 percent in January, ACTEW would commence discussions about introducing (or lifting) restrictions to Stage 1; June storage levels of 34 percent would be signal that Stage 3 restrictions may be needed.
- 3.71 Audit compared the actual level of water restriction in force with the restriction indicated by the dam trigger levels, expecting there to be a reasonably consistent correlation between the actual and indicated restrictions, but this was not the case. This analysis is presented in Table 3.5.

Permanent Water Conservation Measures and Temporary Water Restrictions

Table 3.5: Comparison of actual Stages of restrictions with the dam trigger level

Date	Average dam storage level %	Restriction triggered by dam storage level Stages	Actual Restriction level in force Stages
1 September 2003	49.9	1	1
1 October 2003	52.3	1	2
1 February 2004	57.9	0	2
1 March 2004	55.4	0	1
1 August 2004	43.2	1	1
1 September 2004	43.7	1	2
1 October 2005	61.4	0	2
1 November 2005	63.5	0	Water Conservation Measures
1 February 2006	63.1	0	Water Conservation Measures
1 March 2006	59.5	0	Permanent Water Conservation Measures
1 April 2006	56.1	0	Permanent Water Conservation Measures
1 October 2006	48.1	1	Permanent Water Conservation Measures
1 November 2006	45.1	2	2
1 December 2006	42.3	2	3

Source: ACT Auditor-General's Office analysis of ACTEW data.

3.72 The table above shows that the selected water restriction stage are not aligned with the dam trigger levels, as most of the selected water restrictions were imposed by ACTEW earlier than indicated by the trigger dam levels. Audit's analysis suggests that rather than triggering discussions about what restrictions are required, the indicated restriction had already commenced before the dam storage level reached the point to begin discussion.

3.73 Audit notes that December 2007 was the last time the dam storage levels were at a point that would commence Stage 2 restrictions. From January 2008 to December 2009 the dams have had storage levels that would either introduce Stage 1 restrictions or none at all.

3.74 Audit analysis suggested that dam storage levels had far less significance than other factors in ACTEW's decisions on water restrictions levels, and this has not been always clearly communicated to the ACT Government and the public.

3.75 ACTEW advised:

... the dam trigger levels are only one of many considerations used in deciding on the most appropriate level of restrictions.

This process of weighing a number of factors should not be confused with ACTEW's communication with the public. The need for a particular stage of restrictions cannot be effectively communicated by laying out the complex underlying modelling and all factors taken into account. Rather, to ensure the message is succinct and understood, it needs to be communicated using simple language and tools – dam levels is one such important tool.

3.76 Other factors considered by ACTEW include those at paragraph 3.49.

3.77 The frequency of changes to the level of restrictions is also taken into account. The dam trigger model is intended to minimise the chance of needing to return to the lifted level in too short a time frame. ACTEW advised Audit that:

The modelling used to derive the values assumes relatively trouble-free, reliable operation of the water supply system, and doesn't take into account unforeseen events resulting in major long-term inoperability of components of the system. Given the storages are low in restriction events, the system is more vulnerable to such unforeseen events and the higher individual storages can be maintained – by imposing of restrictions - the better.

3.78 Audit acknowledges the need for ACTEW to take into account a wide range of factors in determining the appropriate stages of water restrictions, including dam storage levels. Given that the decisions to impose water restrictions will have significant implications to households and businesses in the ACT, ACTEW should make information available to the ACT community on the relative significance of factors considered by ACTEW in determining the various stages of water restrictions measures. This will enhance transparency in ACTEW's decision making processes, particularly because ACTEW is a commercial entity and there is a potential conflict between commercial objectives and public interest.

Recommendation 5

ACTEW should improve the transparency of its decision making process by providing, to the extent practicable, information to the public of the relative significance or weighting of the key factors considered by ACTEW in selecting stages of water restrictions.

3.79 ACTEW commented:

it is acknowledged that the public may believe that storage levels and consumption (on our roadside signs) are the critical factors, and that while the other factors taken into consideration are listed in our restrictions scheme available on our web site, we could make it clearer in our publications. However, relative weightings are not possible. Under the current climate uncertainty, it is not possible to scientifically

assign weightings without making major assumptions which would need to be included in the information.

RAISING COMMUNITY AWARENESS

- 3.80 The *Utilities (Water Conservation) Regulations 2006* requires ACTEW to publish changes to water restrictions in a daily newspaper and on the ACTEW website. For Permanent Water Conservation Measures, ACTEW can choose to publish the changes in a daily newspaper and the website. ACTEW can also make the documents available in any other location decided by ACTEW. ACTEW complied with these requirements and exceeded them by running campaigns to increase public awareness and education.
- 3.81 ACTEW ran communication strategies that promoted both the relevant water restriction or conservation measures and water saving practices. These community awareness initiatives played a large part in reducing the water demand in the Canberra region. Examples of the communication strategy from 2007 related to the extension of Stage 3 Temporary Water Restrictions and included the following:
- announcements that Stage 3 would remain in place over spring and summer 2008;
 - communication of the seriousness of Canberra's water situation;
 - increased awareness of the responsibility of individuals in the community under Stage 3;
 - minimising the impact of restrictions on the community; and
 - promoting water saving techniques and strategies.
- 3.82 Methods used to increase public awareness and education included media coverage and interviews such as television and radio advertisements, water week press lift-outs in the Canberra Times, and showerhead giveaways. Community feedback was obtained via emails, mail, phone calls, events, workshops and reports of water misuse. Mechanisms used by ACTEW to measure the effectiveness of the public awareness and education activities included issued website hit rates, telephone survey results, changes in water use, complaints from members of the public, and fines issued for breaches.
- 3.83 One communication tool that was well received by the public was the electronic road signs showing daily targets, daily consumption and dam storage levels. A campaign evaluation and summary report called 'Save Water for Life' compiled by ACTEW in June 2008, reported that 89 percent of the respondents to an independent telephone survey recalled having seen the electronic road signs. Of these, 62 percent considered the boards to be a useful information source and 83 percent believed the boards should be used again. This was the basis for the ACTEW Board decision to use the boards all year round.

CONCLUSION

- 3.84 ACTEW has managed the water restrictions measures effectively, resulting in significant water savings.
- 3.85 ACTEW's level of consultation with the EPA, required under the *Utilities (Water Conservation) Regulation 2006* was ineffective. Consultation with EPA is an important step in the decision-making process, and provides assurance that decisions made are based on all relevant factors, including ACT Government policy. A failure to consult adequately could result in a higher risk that a recommendation made by ACTEW and supported by the Minister lacks appropriate whole-of-government input.
- 3.86 ACTEW reported water savings to the public, measuring savings against a baseline figure, which is the expected consumption with no water restrictions. This approach has the potential to overstate achievements and may not adequately recognise the increasing challenge of delivering further savings on top of those already achieved from the Permanent Water Conservation Measures.
- 3.87 Storage levels in the ACT's dams are used by ACTEW as one of the factors to trigger the possible introduction or variation of water restrictions. Audit found no consistent correlation between the restriction level indicated by dam trigger levels and the actual restriction in place. This suggests that dam storage levels have far less significance in determining water restriction levels than other factors. It would enhance the transparency of ACTEW decisions if the information used by ACTEW in its decision making process, and the relative significance or 'weighting' of various factors, were made readily available to the public.
- 3.88 ACTEW's involvement with the community to increase awareness has played a major part in the success to date of the water restrictions.

4. RESIDENTIAL WATER INITIATIVES

INTRODUCTION

- 4.1 This chapter describes the management and impact of selected residential water saving initiatives. The specific residential programs selected for this audit were rainwater tanks, GardenSmart, and the ToiletSmart Program.
- 4.2 As reported in *Think water, act water* (and figure 3.2), people who occupy blocks of land with gardens are the largest water consumers in the Canberra region. This group (detached houses) is one of five main user groups; it consumed 54 percent²³ of the region's potable water in 2004 (just over 35 GL).²⁴ By 2007-08, consumption by this group reduced to 49 percent or approximately 21 GL.²⁵
- 4.3 The objectives of the residential water initiatives are not only to reduce household water consumption but also to increase public awareness and education about the importance of water conservation.

KEY FINDINGS

- DECCEW has a project management system designed to meet the specific needs of the sustainability programs, including the water saving initiatives reviewed by Audit. The system, however, was not being used to assist the management and reporting of all water initiatives. The Department is in the process of implementing the recommendations of a 2009 internal audit, including reviewing its existing project management system, improving record keeping and reporting.
- Take-up rates for the residential water saving initiatives reviewed were below the assumption rates, and were small relative to the population of the Territory.
- Although the Department reviewed some residential water measures, it did not update the water savings estimates for these measures based on experience to date. The water savings used for modelling and reporting are likely to be overstated.
- The management of residential water efficiency incentives was transferred from ActewAGL to CMD, TAMS and now DECCEW. Since the transfer in 2007, annual reports prepared by ActewAGL under contract ceased. The biennial reports on the *Think water, act water* action plan published since 2007 did not provide information on the effectiveness, or relative merit of residential measures, especially in regard of water saving outcomes.

²³ *Think water, act water, Volume 1, How we use our mains water*, data supplied by ACTEW, p 22.

²⁴ 35.407 GL see Table 3.3 in Chapter 3.

²⁵ 21.343 GL see Table 3.3 in Chapter 3.

Residential water initiatives

- Based on information available to Audit, there was no clear evidence that the selected residential water measures achieved the expected water saving outcomes. For example:
 - studies done on the rainwater tank program in 2005 and 2008, questioned the extent of water savings from this measure;
 - there was no conclusive data on water savings from the GardenSmart program; and
 - although the ToiletSmart program has achieved a significant increase in participation in the past year, it has still fallen short of assumed participation rates.

BACKGROUND

4.4 DECCEW managed eight household water initiatives. As at June 2010, six of these were being implemented, and two were in various stages of development. Four of the programs targeted residential water consumption; ToiletSmart, Rainwater tanks, GardenSmart and IrrigationSmart. This audit reviewed the first three of these initiatives.

4.5 DECCEW is a relatively new ACT Government agency, formed in November 2008. It was formed from an amalgamation of existing divisions from other agencies, primarily with a policy focus.

4.6 DECCEW administered these initiatives by:

- communicating the water saving initiative offer to the public;
- establishing eligibility criteria;
- providing the rebate forms to the public to complete;
- approving rebate payments;
- conducting satisfaction surveys; and
- outsourcing services required to deliver the initiatives.

MANAGEMENT OF RESIDENTIAL WATER SAVING INITIATIVES

4.7 Late 2009, DECCEW released its first corporate plan for 2010-2014. The corporate plan stated that each branch had a business plan that reflected the strategic priorities identified in the corporate plan and contained detailed work programs necessary to deliver these priorities. At the time of this audit, (June 2010) these business plans did not exist to provide direction for implementation of the action plan by DECCEW of relevant aspects for *Think water, act water*.

- 4.8 DECCEW has a project management system designed to meet the specific management needs of the sustainability programs, including the water saving initiatives reviewed by Audit. The system was not being used. DECCEW had advised that resourcing constraints, caused by the need to develop several new programs, had delayed implementation. Information on individual water projects were kept in Excel spreadsheets and was not being centrally recorded and analysed, making it difficult for effective management and reporting on the success or otherwise of all water initiatives. DECCEW advised that this issue was identified in an internal audit review and is currently being addressed.
- 4.9 ActewAGL, on behalf of ACTEW, and under contract, managed the ACT Government's water efficiency incentives program from 2004 to 2007, including the initiatives reviewed in this audit. During this time, annual reports on all initiatives were produced. Since 2007, water efficiency incentives have been managed by CMD, TAMS and now DECCEW. As the previous contractual arrangements ceased, annual reports were no longer being produced on the water efficiency incentives program. As a result, target figures and expenditure of each water efficiency initiative were no longer being reported annually. DECCEW now reports progress every two years. The progress report (volume 1) against the *Think water, act water* action plan, covering 2007-08 and 2008-09 was released on 9 June 2010, with volume 2 due for release on the completion of the *Think water, act water* Strategy review, currently underway.
- 4.10 When assessing the effectiveness of the residential water initiatives, Audit did not find any information on the targets after 2006-07, only estimates of water savings based on assumptions. Useful data on the actual take-up rates for the initiatives was not easy to locate.
- 4.11 Although expenditure items were kept in the Department financial system, there was no substantive project management reporting or analysis of expenditure, hence it is difficult to analyse the cost-effectiveness of the residential water initiatives.

Recommendation 6

DECCEW should implement its custom-made project management system to manage water saving initiatives. This will encourage consistent management practices, including the centralised recording of relevant information, which will facilitate reporting and evaluation of the initiatives.

ANALYSIS OF WATER EFFICIENT INITIATIVES

- 4.12 This section discusses the targets, actual take-up rates and assumptions associated with each of the three initiatives reviewed by audit:
- Rainwater tanks;
 - GardenSmart; and
 - ToiletSmart.

Rainwater tanks

- 4.13 Rainwater tank incentive programs have been offered to ACT residents since 1997. Rainwater tank incentive programs have evolved from the 1997 (\$100 for any tank size) to the current program, which has operated since 2005-06. The current program offers rebates up to \$1 000 depending on the tank size and a separate rebate when internal plumbing is installed. The ACT Government provided a rebate to residents who met the specified requirements of the existing program. In addition, Commonwealth rebates for water tank installation were made available from January 2009. Eligible residents may claim both the ACT Government and Commonwealth Government rebates.
- 4.14 The program aimed to encourage residents to install tanks to collect rainwater and to use rainwater to replace potable water. Water collected by rainwater tanks was supposed to reduce the demand on mains water. For this outcome to be most effective, collected water has to be consumed instead of potable water. The most reliable way for rainwater use to occur is to have the tank connected to the internal plumbing system. As a result, rebates for unconnected rainwater tanks ceased in May 2005.

*Actual Rainwater tank rebates and estimated water savings***Table 4.1: Rainwater tank rebates: Actual results and estimated water savings**

Financial year	Actual rebate (no. of tanks)	Actual rebate (\$)	Cumulative estimated water savings by DECCEW (GL)
1997-2004	614	N/A	
2004-2005	823	328 800	0.091
2005-2006	300	19 700	0.093
2006-2007	108	72 700	0.101
2007-2008	154	117 800	0.115
2008-2009	193	139 200	0.131
Total	1 578*	678 200	

Source: ACT Auditor-General's Office based on various DECCEW sources.

* Total does not include the 614 tanks provided from 1997-2004 and includes 54 internal connections.

4.15 In 2005-06, rebates for 300 tanks were paid. Of these 300 tank rebates, 267 were actually 2004-05 rebates processed in 2005-06, leaving only 33 new tanks and internal connections for 2005-06. The fall in the take-up rate in 2005-06 reflected the changes in eligibility which required internal plumbing connections. From 2006-07 the take-up rate has increased and was 224 at the end of May 2010.

Assumptions

4.16 DECCEW made the following assumptions regarding the installation of rainwater tanks, and reporting progress:

- 86 kilolitres of water per tank per year will be saved assuming connection to toilet flushing and 150 m² roof and 10 kilolitre tank size;
- 300 tanks installed each year; and
- each unit will cost \$3 240 with \$50 operating cost.

4.17 DECCEW advised Audit that it has revised the assumption for a take-up rate for tank rebates downward to 200 tanks per annum.

Water saving impact of rainwater tanks

4.18 There is little statistical correlation between the installation of a rainwater tank and a change in average mains water use. There are many unknown variables that make the assessment difficult. ActewAGL believed that without further research to better understand other demand factors that often coincide with the installation of rainwater tanks, for example, the establishment of gardens, installation of

Residential water initiatives

swimming pools and house extensions, it is not possible to make an assessment of the impact of rainwater tanks on mains water.

- 4.19 In 2005, an ActewAGL report examined 106 households that installed rainwater tanks. The report analysed reductions in metered water consumption as an indicator to the impact of rainwater tank installation. Data was separated by tank size and water consumption before and after tank installation were compared. The basis for comparison was average daily residential water consumption for Canberra. Results showed about 50 percent decreased and 50 percent increased water use after the rainwater tank was installed.
- 4.20 The report findings stated that water use and rainwater tank installation results are based on the water consumption of the individual households. External factors had to be taken into account that were beyond the scope of that report. The report concluded that:
- ... governing bodies [should] be cautious in their effort to promote the installation of rainwater tanks in the ACT with the expectation that it will deliver real, effective water demand savings.
- 4.21 The ActewAGL report on rainwater tank installation was also evaluated by the Institute of Sustainable Futures to provide advice on future analysis. The Institute concluded that as significant resources were being invested in rainwater tank rebates, more detailed analysis needed to be conducted. The Institute pointed out that rainwater tank water is often used for outdoors and outdoor watering is most common in summer, the elimination of seasonal trend may not detect the changes in water consumption habits. It recommended the use of a control group, without rainwater tanks, for the comparison of water consumption over the same period.
- 4.22 Analysis has been done on the Rainwater Tank Program in 2005 (commissioned by ActewAGL) and 2008 (commissioned by DECCEW). Both studies raised doubts on the water savings from rainwater tank measure.

GardenSmart

- 4.23 GardenSmart refers to a program where a trained, qualified horticulturist visits residential gardens and provided professional advice on issues like garden design, plant choice and better watering practices. The program was initially known as the Outdoor Water Tune-up Program.
- 4.24 The provider of the GardenSmart program was contracted by Procurement Solutions via a tender process, and a service agreement between the successful tenders and the Australian Capital Territory. The successful applicant was awarded a contract to deliver the GardenSmart program on an annual basis. GardenSmart has been carried out by the same service provider for all years from 2004-05 (January 2005) until 2009-10, when a new service provider was awarded the contract.

- 4.25 Features of GardenSmart have changed over time. There was originally a \$30 cost to the householder and a \$50 rebate for selected items from particular suppliers. In June 2007, the \$30 fee to the participant was removed. During the program, the \$50 rebate was increased periodically to \$100 to encourage sign-up.
- 4.26 The current GardenSmart program is free and provides a \$50 rebate for items on a list that assist in creating a water efficient garden.

Actual tune-ups and estimated water savings

Table 4.2: GardenSmart program: Actual results and estimated water savings

Financial year	Actual completed number of tune-ups from data provided	Cumulative actual water savings * GL	Cumulative estimated water savings by DECCEW GL
2004 -2005	623	unknown	0.018
2005-2006	854	unknown	0.043
2006-2007	854	unknown	0.107
2007-2008	1357	unknown	0.143
2008-2009	1234	unknown	0.172
Total	4922		

Source: ACT Auditor-General's Office based on various DECCEW sources.
 * As DECCEW has not verified whether any recommendations to residents from GardenSmart tune-ups have been implemented, it is not possible to determine whether any actual water savings have resulted (see paragraph 4.28 below).

Assumptions

- 4.27 The assumptions being made around the water savings of GardenSmart included:
- 29 kilolitres of water saved per outdoor tune-up per year;
 - 1 000 visits per year with a cost of \$150 per visit including the product rebate;
 - \$30 000 cost per year to maintain the program; and
 - the program will run for eleven years, including a proposed five year extension.

Water saving impact of GardenSmart

- 4.28 DECCEW assumed that every garden visited in the GardenSmart program will save 29 kilolitres of water per year. This saving represents eleven percent of household water consumption (using the average household annual consumption of 250 kilolitres provided by the Water Conservation Office).

Residential water initiatives

- 4.29 DECCEW followed up with surveys of GardenSmart participants which sought information on participants' water consumption changes including changes in behaviour. While the survey provided some useful information on the increased awareness of water savings and behaviour changes, there is no data to measure the extent of water savings. A 2009 market research report, commissioned by DECCEW, indicated a mixed result with around one third of GardenSmart participants in the focus group believed that their outdoor tap water had reduced, one third believed nil outdoor tap water savings and the remaining third expressed uncertainty. Similarly, another DECCEW's review in 2008 concluded that there was some indication that the GardenSmart program did not save water, or even increased water use by participants. Consequently, there was no conclusive data to assess whether the GardenSmart program delivered its intended outcomes. Water savings should not be assumed from the GardenSmart program without reliable evidence to support the assumptions.

ToiletSmart

- 4.30 The ToiletSmart program commenced in May 2008, replacing a program known as the 'Dual-flush toilet rebate program' that had been offered since January 2005. The program offered ACT homeowners of residential properties connected to mains water, an incentive to replace single flush toilets with four-star, water efficiency 4.5/3 litre dual-flush toilets. DECCEW managed the program.
- 4.31 ToiletSmart offered a \$100 rebate to non-pensioners. Pensioners were offered full rebate of \$465 including installation. The pensioner offer was not previously available.

*Actual ToiletSmart rebates and estimated water savings***Table 4.3: ToiletSmart program: Actual and estimated water savings**

Financial year	Actual number of toilet rebates	Total rebate paid \$	Cumulative estimated water savings by DECCEW GL
2004 – 2005	152	15 200	0.005
2005 – 2006	273	27 300	0.015
2006 – 2007	164	16 400	0.021
2007 – 2008	435	Unknown	0.036
2008 – 2009	3 353	Unknown	0.160

Source: ACT Auditor-General's Office based on various DECCEW sources.

Assumptions

4.32 The assumptions made in relation to the water savings of ToiletSmart reflect the three variations of the program run since 2004 and are as follows.

Partial rebate (\$100)

- 37 kilolitres of water savings per 4.5/3 litre dual-flush toilet per year compared with 11 litre single flush;
- Number of dual-flush toilets replacing single flush toilets will increase by 2 000 per year for five years; and
- Cost to the ACT Government will be \$100, cost to the customer \$445.

Full rebate (for pensioners)

- 37 kilolitres of water savings per 4.5/3 litre dual-flush toilet per year compared with 11 litre single flush;
- Number of dual-flush toilets replacing single flush toilets will increase by 250 per year for five years; and
- Cost of each toilet is \$465 unless otherwise stated.

Dual-Flush Toilet Rebate Program

- 35 kilolitres water savings per 6/3 litre dual-flush toilet per year compared with 11 litre single flush; and
- Number of dual-flush toilets replacing single flush toilets will increase by 200 per year.

Residential water initiatives

- 4.33 DECCEW assumed there would be a significant increase in take-up when the revised program was introduced in May 2008. This occurred, as shown in Table 4.3.
- 4.34 Audit noted that the 2008 report, commissioned by DECCEW, concluded that the ToiletSmart program achieved the greatest water savings of the measures reviewed.

Recommendation 7

DECCEW should ensure data used for estimates and assumptions for water savings from residential initiatives is updated and verifiable.

CONCLUSION

- 4.35 Take-up rates of the residential water saving initiatives are relatively low when compared to Canberra's population, around 350 000 in 2009. Residents have not accessed the rainwater tanks rebate to the extent expected. The estimated installations were recently revised from 300 to 200 rebates. Participation in the GardenSmart program has exceeded assumed rates, but was low relative to the population. The ToiletSmart program has achieved a significant increase in participation in the past year, but has still fallen short of assumed participation rates.
- 4.36 DECCEW advised that:
- Take-up rate is dependent on consumer behaviour and perceptions which in turn are influenced by economic conditions and weather. The only influence that the program manager can have on take-up rate is through promotion and awareness raising, which the Department undertakes for these programs.
- 4.37 Water savings estimates for the residential initiatives reviewed are overstated. For example, the low level of installations of rainwater tanks, combined with the warning from ActewAGL that caution was needed in promoting the tanks as delivering 'real, effective water demand savings', signals a need for a conservative approach. Further, the GardenSmart program assumes the property owner implemented all recommendations to improve water efficiency in the garden, but recent studies could not verify whether the recommendations have been implemented or any actual water savings achieved from the program.
- 4.38 DECCEW has not yet implemented its custom-made system to manage the water saving initiatives projects. As a result, there was a lack of proper analysis and reporting against assumptions and expenditure for management and evaluation purposes.
- 4.39 The use of the custom-made system would facilitate centralised recording of information on the initiatives and the effective preparation of past data and trends

related to the initiatives. Reporting on effectiveness of water saving initiatives should be transparent with targets, actual results, assumptions used and actual expenditure.

- 4.40 Management of the water saving initiatives could be improved by DECCEW:
- completing internal policy and procedures including branch business plans;
 - implementing the custom-made project management system; and
 - recording information about the water initiatives centrally to assist program management, evaluation and reporting.
- 4.41 It must be recognised that water savings from the residential initiatives reviewed are small in comparison to the estimated savings required to meet the targets in *Think water, act water*. The ACT Government had forecast that water savings from Permanent Water Conservation Measures and residential water efficient appliances, including the residential water saving initiatives reviewed in this audit, would be required to achieve the long-term savings under the strategy. Together the residential water saving initiatives were expected to contribute around ten percent of the 2013 target and four percent of the 2023 target (or saving with 2003 as a base year of roughly 1.4 GL by 2013 and 0.7 GL by 2023).
- 4.42 Although overall there have been significant water savings from the *Think water, act water* and related initiatives to date, savings from the residential initiatives are expected to be small. The household water meters only measure total consumption for a property, therefore it was not possible to assess which initiatives contribute to water reduction. Further, initiatives and actions under *Think water, act water* run parallel to water restriction measures, and rainfall and water pricing are also contributing factors to household water consumption.
- 4.43 Audit recognises that residential water programs are contributing to the awareness and education of the community and long-term changes in community attitudes towards water use. Nevertheless, Audit considers that DECCEW should regularly revisit the assumptions regarding the forecast water savings from residential water initiatives to ensure they are reasonable in the light of experience to date, and to enable the consideration of any water saving benefits against the cost of these programs.

5. FLEMINGTON ROAD PONDS PROJECT

INTRODUCTION

5.1 This chapter focuses on the Flemington Road Ponds Project as a pilot project of the Canberra Integrated Urban Waterways Program (CIUWP). The program aims to replace potable water with alternative water sources for irrigation. CIUWP involves the installation of ponds or lakes in residential areas that will replace existing stormwater drains. These ponds will be linked to other ponds by using pipes and pumps (reticulation) and, where possible, aquifers. The storm water being collected from this program is non-potable water that will be delivered to end users to water sportsgrounds and parks.

KEY FINDINGS

- The Flemington Road Ponds Project was the first stage of a larger project- the Canberra Integrated Urban Waterways Project (CIUWP) - to provide non-potable water to sportsgrounds and recreational areas.
- DECCEW took over the management of the CIUWP program from TAMS in November 2008.
- The construction of the Flemington Road Ponds Project was planned for completion in June 2008, but actual completion (without landscaping) occurred in October 2009.
- The pilot project allowed opportunity to address issues like asset ownership and pricing of non-potable water. These issues are being progressed and still to be considered by the Government.
- The Flemington Road ponds are not yet supplying non-potable water to end users, and none of the expected water savings from the CIUWP has been delivered as originally intended (1.5 GL of non potable water by 2010). DECCEW expects the supply of non-potable water to occur in 2011, and the CIUWP target of 3 GL to be met by the revised timetable of 2015, as re-negotiated with the Commonwealth.
- Funding arrangements established between the Commonwealth and ACT Governments included \$3.3 million to be generated by developer contributions. The developer contribution scheme has been reconsidered, so none of the \$3.3 million has been raised. The ACT Government will have to meet this shortfall.

BACKGROUND

The Canberra Integrated Urban Waterways Project

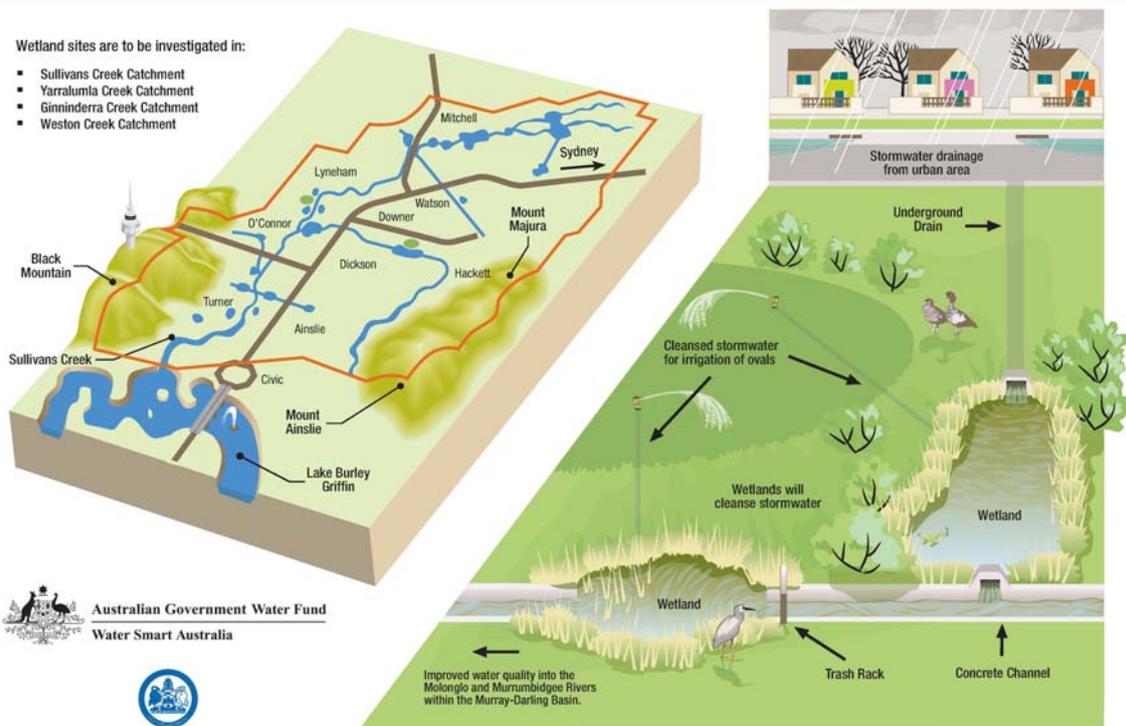
5.2 The Canberra Integrated Urban Waterways Project (CIUWP) is a key initiative that contributes to the ACT Government's plan to provide water security to the

Flemington Road ponds project

community. This program was intended to develop and retrofit existing stormwater systems with environmentally friendly ponds and wetlands and enable stormwater to be used to irrigate nearby sports grounds and parks. Developing non-potable water supplies to irrigators intended to reduce vulnerability to water restrictions and lower the cost of supply. CIUWP has a long-term aim of conserving 3 GL of drinking water each year by replacing it with collected stormwater for outdoor use.

- 5.3 CIUWP promoted water sensitive urban design and improved water quality and flood protection. It enhances landscaping and amenity value while contributing to the habitat of aquatic life.

Canberra Integrated Urban Waterways Project - Sullivans Creek Catchment



The Flemington Road Ponds Project

- 5.4 The Flemington Road Ponds Project consists of two ponds that have been constructed as part of a pilot project of CIUWP (Pond 1 is adjacent to Morphet Street and Pond 2 is adjacent to Randwick Road). Completion of this project was expected to inform decision making in relation to ownership and management of infrastructure, pricing and cost recovery arrangements in relation to the Program.

PROJECT INITIATION AND APPROVAL

Funding proposal

- 5.5 In August 2006, the ACT Government submitted the 'Canberra Integrated Urban Waterways' proposal to the Commonwealth Government via the National Water Commission (NWC) for grant funding from the Australian Government Water Fund. The NWC was the funding agency that administered the Australian Government's 'Water Smart Australia Program'.
- 5.6 The ACT Government sought funding for the CIUWP proposal from the Commonwealth through the Australian Government Water Fund. The CIUWP supports Commonwealth National Water Initiatives that encouraged water re-use, innovation, and capacity building to create water sensitive cities.
- 5.7 The CIUWP proposal was developed by Territory and Municipal Services (TAMS) in consultation with the Chief Executive Water Group and ACT government agencies including ACTPLA, Treasury and CMD. The framework was formalised at program inception and endorsed by the Chief Minister. After the creation of DECCEW in November 2008, DECCEW took over the role of TAMS in relation to the program.
- 5.8 The Commonwealth policy initiatives aligned with the ACT *Think water, act water* strategy, and advanced ACT Government policy objectives in relation to water sensitive urban design and urban stormwater management.
- 5.9 A Funding Deed between the Commonwealth and ACT Government for the CIUWP was signed in February 2007. Since then there have been four variations to the Funding Deed mostly to recognise timing issues around completion of the Project.

PROJECT PLANNING

- 5.10 An initial step in the CIUWP was to identify potential sites that would deliver stormwater harvesting options at the lowest cost and collectively deliver 1.5 GL per year by 2010 and 3 GL per year potable water savings to the community by 2015. Sullivan's Creek Catchment was expected to contribute 0.6 GL towards the 3 GL target.
- 5.11 Flemington Road Ponds was to contribute a storage target of 0.2 GL for Pond 1 and 0.55 GL for Pond 2. Over the duration of the pond construction, Pond 2 capacity reduced by 0.10 GL due to changes to the original design. The design change was expected to improve the pond yield. The total storage for Flemington Road Ponds Project is now 0.65 GL.

Water Quality and Site Selection

- 5.12 Sullivan's Creek Catchment was the largest urban catchment flowing into Lake Burley Griffin and a lack of pollution controls resulted in water pollution levels higher than in other monitored streams. Previous studies undertaken for ACTPLA, in relation to water quality improvements in Sullivan's Creek Catchment identified Flemington Road Ponds Project as a priority site for water quality improvement.
- 5.13 The new ponds to be constructed under CIUWP provided flood protection and improved water quality and supported outcomes in terms of the Territory's draft *Water Sensitive Urban Design Guidelines*.

Feasibility Studies

- 5.14 Detailed feasibility studies and site selection methodologies were undertaken by CSIRO that identified potential end users and stormwater harvesting and aquifer storage and recovery options across urban areas of Canberra. Master plans that collectively achieved the potable water savings target were developed based on these studies.
- 5.15 Between April 2007 and June 2008, the CSIRO established a strategic framework for the Program and developed a site selection methodology. The Flemington Road Ponds Project commenced in March 2007 and construction of the first pond was completed in May 2008. As the first pond was built, the findings of the CSIRO feasibility study were applied to the second pond.
- 5.16 The CIUWP feasibility studies determining storm water options were a more complex task than originally planned, and involved (among other things) a re-analysis of methodology due to changes in key assumptions. The feasibility studies were completed eighteen months later than originally scheduled.
- 5.17 The opportunity for stormwater harvesting was examined at a late stage in the Flemington Road Ponds Project design in response to issues identified in the CSIRO study. Research helped explain low yield outcomes for the first pond and informed subsequent design work.

Project commencement

- 5.18 There was a Commonwealth requirement to have some works 'on the ground' by October 2007. A work plan for the Sullivans Creek Catchment was completed in April 2007 based on previous work undertaken. As the Flemington Road Ponds Project site had been identified in these studies as part of the Sullivan's Creek Catchment, it was the project considered to be in the best position to progress quickly. Planning, detailed design and construction of ponds in this catchment was to be completed by June 2008.

FUNDING ARRANGEMENTS

- 5.19 CIUWP was jointly funded by the Commonwealth and ACT Government based on a 60:40 percent funding arrangement. The Commonwealth Water Smart Program Grant committed to \$10.2 million (60 percent). The ACT Government committed to \$6.8 million (40 percent) in funding.
- 5.20 ACT funding consisted of three components:
- financial;
 - in-kind; and
 - developer contributions.
- 5.21 The Funding Deed between the Commonwealth and ACT Government was dependent on achieving specific milestones that were detailed in the Deed. Grant funding was delivered in tranches when the Commonwealth Government funding agency was satisfied that key milestones were achieved in relation to agreed time frames.
- 5.22 Progress reports were submitted to the Commonwealth prior to obtaining funding. Financial reporting on income and expenditure, balance sheet related items and variance to project budget are also requirements of the Deed. The reporting arrangements specified in the Funding Deed required the Territory to provide the Commonwealth with audited financial statements and information on the ACT Government contributions on an annual basis.

Flemington Road Ponds Project funding arrangements

- 5.23 Under the CIUWP funding arrangement, the Commonwealth funding was made available to progress the feasibility, consultancy, planning and design phase of the Program and progress the Flemington Road Ponds Project to completion.
- 5.24 Although the CIUWP is supposed to be funded by both the Commonwealth and ACT Governments the only completed component so far, Flemington Road Ponds Project, was fully funded by Commonwealth funds.
- 5.25 The engineering design for the Flemington Road Ponds Project reticulation is scheduled to be completed by mid 2010, and will be funded by the CIUWP. Design and construction of two new ponds (Dickson and Lyneham wetland ponds, due to commence in August 2010) are being funded by the ACT Government. To date the ACT Government has appropriated in excess of \$50 million to progress projects including the CIUWP.
- 5.26 Given that in March 2010 only two ponds have been completed, and they were not yet serving as an alternative water supply for irrigation purposes, the CIUWP will not achieve the original target of replacing 1.5 GL of portable water by 2010.

Flemington Road ponds project

The timeline for delivering against the total target of 3 GL has been renegotiated with the Commonwealth to 2015.

5.27 Construction delays in relation to the second pond and the delay relating to studies undertaken to progress the other projects within the CIUWP resulted in the program being extended by one year until June 2011.

5.28 DECCEW advised that:

It is anticipated that with the construction of the Dickson and Lyneham ponds (due to commence in August 2010) and the construction of reticulation infrastructure from these ponds to Flemington that the inner north scheme will be able to supply non-potable water in 2011. The target of 3 GL is expected to be met by 2015.

Flemington Road Ponds Project construction cost

5.29 The original budget for the Flemington Road Ponds Project was \$4.4 million including GST. Originally, tenders were received for the design and construction of the two ponds in August 2007, and a development application for the project was approved in September 2007. Tenders were called for both ponds, but exceeded the approved \$4.4 million budget. The lowest tender was for \$5.6 million. Although tenders had been called for two stages (two ponds), tenderers were advised that only one stage would be progressed as there were funding limitations.

5.30 Actual construction, management and consultancy expenses for the pilot project amounted to \$5.3 million (Pond 1 \$2.9 million and Pond 2 \$2.4 million). The second pond was reduced in size and the design and pump system changed. At the time of the audit, the landscaping for the second pond has not been completed and further costs may be incurred.

ACT Government contribution

5.31 As previously mentioned, under the joint Commonwealth and ACT funding arrangements for the CIUWP, the ACT Government will contribute \$6.8 million. Of this \$6.8 million, \$3.5 million consisted of financial and 'in-kind' contributions from the ACT Government, and the remaining \$3.3 million was to be collected from developers' contributions. The in-kind contribution consisted of a percentage of staff salaries that were apportioned to the project. This consisted of salary payments for staff from ACTPLA, ACTEW, Treasury, Land Development Agency (LDA) and TAMS and now DECCEW.

5.32 Initially the in-kind contribution was \$787 500 over the four-year time frame of the project, but was increased to \$1 088 500 in June 2007. The ACT Government requested an increase in the 'in-kind' contribution and a reduction in the financial contribution through a variation to the Funding Deed. The table below shows the financial and in-kind contributions and variations.

Table 5.1: Variation to ACT government funding arrangements

In-kind contribution	Date in which payment is made	Total amount	
		Funding Deed (February 2007) \$	Variation 1 Funding Deed (June 2007) \$
In-kind contribution includes staff and associated resources to manage the project	2006-07	112 500	155 500
	2007-08	225 000	311 000
	2008-09	225 000	311 000
	2009-10	225 000	311 000
Financial contribution	2009/10	2 712 500	2 412 000
Totals		3 500 000	3 500 500

Source: Funding Deed and variations

5.33 The Funding Deed required that the in-kind contributions should be reported to the Commonwealth annually. Audit noted that progress reports and audited financial statements for the financial years 2007-08 and 2008-09 were submitted to the Commonwealth.

5.34 The statements included a certification by DECCEW to the effect that in-kind contributions had been provided by the ACT and managed in accordance with the Funding Deed. This aspect (i.e. the in-kind contributions) was not audited by the auditor commissioned by DECCEW.

5.35 DECCEW advised that:

Since 2006 the ACT Government has made in-kind contributions of around \$750,000 to the project. Given that the project has been extended to 2010-11 the ACT Government is on target to meet their contribution of \$1 million over the project life

Developer contribution

5.36 Part of the ACT Government agreed funding of \$6.8 million to the CIUWP was \$3.3 million to be generated by contributions from the developers to off-site stormwater works in the ACT. Under the Funding Deed, this financial contribution was expected to be received by 2009-10.

5.37 In 2006, when the CIUWP was being developed, the ACT Government had in-principle support from representatives of the property and land development industry for a suitable developer contribution scheme. The representatives

Flemington Road ponds project

advised of their interest in establishing urban wetlands in place of on-site stormwater detention structures currently installed within development projects.

- 5.38 The funding proposal envisaged that a levy on developers could be directed to the Canberra waterways program and achieve a range of 'water sensitive urban design' objectives that would benefit the community through the construction of wetland ponds adjacent to property and land developments.
- 5.39 DECCEW has not progressed this issue, notwithstanding the developer contribution being due in 2009-10. Consequently, the \$3.3 million shortfall in funding for the program must be met by the ACT Government.
- 5.40 DECCEW advised:

At the time of preparing the funding application, the ACT Government was in the preliminary stage of developing within ACTPLA a scheme for land developers to make cash contributions towards public projects for harvesting stormwater in lieu of requirements for them to meet on-site detention of stormwater. It was anticipated that such a scheme could generate significant revenue which could contribute to developing constructed urban wetland projects. This preliminary proposal was supported by the ACT property and building peak groups. Subsequent investigation by ACTPLA indicated that the cost involved, including administrative costs, rendered the Scheme unviable. Costs associated with providing greenfield infrastructure are provided as trunk capital works item by ACPLA/TAMS or recovered through land sale prices where funded by the LDA.

Recommendation 8

DECCEW should:

- progress with the developer contributions to the cost of delivering the Canberra Integrated Urban Waterways Project as originally planned, or
- if developer contributions are not to be pursued, seek approval from the ACT Government of revised funding arrangement and formally advise the Commonwealth government and seek an amendment to the Funding Deed.

PROJECT CONTROL

- 5.41 The Funding Deed not only established the funding arrangements but is also the overarching governance framework in relation to the CIUWP. The intention of the governance framework was to ensure coordination and oversight throughout the CIUWP and ensure key agencies were being kept informed and being consulted on a range of issues in relation to the CIUWP.
- 5.42 Progress was to be reported to the ACT and Commonwealth Governments.

5.43 When seeking funds under the national Water Fund Project Proposals, the ACT Government envisaged that the CIUWP would ‘coordinate stakeholder-based development of ‘integrated waterway management master plans’, providing a vehicle for building government, community, industry and research sector partnership and shared responsibilities for resource management’. Participating agencies were encouraged to provide input on a range of issues. The governance framework is shown below.

Table 5.2: Canberra Integrated Urban Waterways Project - Management and reporting structure developed in 2006 (TAMS is now replaced by DECCEW)

Governance Arrangement	Responsibilities
Steering Committee (representatives from TAMS, ACTPLA, DECCEW and the National Water Commission)	<ul style="list-style-type: none"> • Coordinate and oversee the performance of the Program. • Strategic decision making role and oversight of Project. • Approval of brief and procurement processes. • Oversee the Project Management Team.
Project Team (representatives from TAMS, ACTPLA, ACTEW and DECCEW)	Coordinate all Program activities including: <ul style="list-style-type: none"> • drafting of consultants briefs and procurement documentation; • conduct tender process with Procurement Solutions assistance; • negotiate contract with consultants; • day-to-day management of contract and consultants issues; and • report to Steering Committee, Senior Executive Coordination Group and National Water Commission.
Technical Committee (coordinated by TAMS, now DECCEW)	<ul style="list-style-type: none"> • Provide technical advice to contractors, Project Team and Steering Committee on project components on a needs basis.
Senior Executive Working Group	<ul style="list-style-type: none"> • Review progress (standing agenda item).

Source: DECCEW.

5.44 The Steering Committee was intended to oversee the program to completion. Its terms of reference were spelled out in the Funding Deed. This committee had a strategic decision making role and was tasked with addressing key aspects of the program, including to oversee the Project Management Team, obtain information regarding the progress of the Program, and provide comment and guidance as required.

5.45 A working group of senior officers assisted the Steering Committee. A Senior Executive Water Group (SEWG) provided representation from relevant agencies. In June 2008, there was a change in arrangements and a Technical Committee provided advice to the Steering Committee, Project Team and contractors. The Technical Committee replaced the role of the SEWG.

Progress reports and variations

- 5.46 Under the funding agreement, a progress reporting regime informs the Commonwealth agency administering the Program in relation to key issues impacting Program outcomes. The progress reports provided the Commonwealth with a detailed description and analysis of work completed and CIUWP requirements to progress milestones for the next reporting period.
- 5.47 Changes to key Program milestones required prior authorisation from the Commonwealth Agency administering the program. The Chief Executive of DECCEW recommended variations to the Funding Deed where necessary. Delays on Flemington Road Ponds Project milestones resulted in the program being extended by one year up to June 2011.
- 5.48 The construction of the Flemington Road Ponds was essentially completed in October 2009, although the ponds are not yet supplying non-potable water to end-users (this aspect of the CIUWP relies on more ponds being constructed). The Commonwealth has been kept informed of the progress and all the variations, as required by the Progress Reporting Framework included in the Funding Deed.

Meeting frequency

- 5.49 Meetings of the Steering Committee and Project Team were held regularly up to June 2008, but lapsed for an extended period up to December 2009. The Flemington Road Ponds Project second pond was constructed during this period.
- 5.50 Audit considers that the absence of input from Steering Committee during the construction of Pond 2 increased the risk that knowledge transfer across, and consultation between, agencies did not take place as originally intended.
- 5.51 The Senior Executive Water Group met only once in early 2007 and lapsed until a request from TAMS to reconvene the Group in February 2008. This was attributed to a lack of resources following the transfer of the Energy and Water Policy activities from CMD to TAMS. As noted earlier in this report, the SEWG has an important role in supporting the Chief Executive Working Group to implement and oversee the water demand management program. In the absence of frequent meetings as anticipated in the governance arrangements, all key agencies may not be properly informed and/or consulted on the projects.
- 5.52 DECCEW advised that the Chief Executives Water Group and Senior Executives Water Group meet on 'as needs' basis rather than under a scheduled program of meetings due to the amalgamation of programs and policy under one agency.

PROJECT COMPLETION AND EVALUATION

- 5.53 A key milestone of the CIUWP was the construction of two ponds at an early stage of the program. Although detailed design for the two ponds was completed within the projected time frame, it was decided that only one pond would be constructed at the initial stage as tender submissions exceeded the authorised budget.
- 5.54 Planning for the ponds was fast-tracked, but it soon became evident that there was insufficient understanding of key factors impacting pond yield, water quality and related outcomes for end users at the time. Further studies were needed to resolve issues such as stormwater losses to aquifers (thus lowering the inflow to the ponds). These studies informed planning for the second pond and contributed to delays in commencing construction.
- 5.55 Completion of ‘high value opportunities in the Sullivans Creek Catchment’ was a key milestone in relation to the CIUWP Funding Deed. This milestone, which referred to the construction of the two ponds, was delivered sixteen months later than originally planned for June 2008. The first pond was commenced in December 2007 and completed in May 2008. Work on the second pond started in January 2009 and was essentially complete (other than landscaping) by October 2009.
- 5.56 The intention of Flemington Road Ponds Project was to test issues associated with the design and operation of an alternative supply of non-portable water for irrigation purposes. It has now been nine months since Pond 2 was constructed in October 2009 and these issues have not been conclusively resolved.
- 5.57 The Flemington Road Ponds pilot project has not been formally evaluated to date. The Steering Committee agreed in December 2009 that the operational model will be tested two years after completion of Flemington Road Ponds. Two years of financial and operational data will be collected and the project will be reviewed in the following year.
- 5.58 DECCEW has been progressing a number of issues in relation to licensing and pricing of non-potable water available from this project. DECCEW has obtained formal advice on pricing from ICRC (April 2010) and advice from the Government Solicitor’s Office concerning ownership and licensing arrangement. DECCEW is finalising a submission to the Government recommending a price range per kilolitre for delivery non-potable water and a price for the Water Abstraction Charge. This submission also makes recommendations on asset operation, maintenance and ownership for the trial sites that is expected to be considered by the ACT Government in July 2010. Reticulation arrangements and end-user demand remain unresolved at this stage.

Aquifers

- 5.59 Aquifers are natural underground water storage systems. They can take thousands of years to fill and they transfer the water at a much slower rate than rivers and creeks. Aquifers leak water slowly into rivers, keeping them flowing through the long dry season.²⁶
- 5.60 A major reason for the Flemington Road Ponds Project delay was the time taken to research the use of aquifers for water storage. The advantages of aquifer storage included reduced water loss through evaporation, improving the quality of water entering the aquifers through filtering stormwater and increasing the water volumes into the aquifers. Each pond location will also face different aquifer opportunities.
- 5.61 Research resulted in differing opinions on the aquifer qualities, thus delaying integration of the aquifers into the CIUWP until the issues could be resolved. The intention at the time of audit was to link the ponds with pipes and integrate the aquifers when the issues have been resolved.
- 5.62 If and when the aquifers are integrated into the ponds, great care must be taken to only withdraw the same amount, or less, than the stormwater harvesting has input. Monitoring the extraction process is essential to ensure that existing ground water stores are not being used to water recreational areas.
- 5.63 DECCEW advised that:
- Water extracted from aquifer can be measured by installing volumetric meter gauges. In granting water licences, the Environment Protection Authority would require that the amount of water extracted from the aquifer was monitored by such a device. These devices will be installed once the reticulation piping is in place.

COMMUNITY ENGAGEMENT AND CONSULTATION

- 5.64 The social impact of stormwater harvesting was examined using focus groups, web-based surveys and community workshops and formed part of the feasibility stage of the CSIRO study. Stakeholder preferences in relation to social, economic and environmental issues were evaluated in relation to the Flemington Road Ponds Project site, as it was one of the top ten sites selected for storm water harvesting in the CSIRO Master Plan. The CSIRO study considered that site selection for the project was robust.
- 5.65 The CIUWP had a dedicated community engagement officer in DECCEW, who works with ACT Government agency representatives. Together they have initiated a series of community related activities promoting awareness and interests in the wetland projects. These activities encourage community

²⁶ Storzaker, R. *Scientist's Garden a Story of Water and Food*, CSIRO publishing, pp 111 & 112.

- engagement, consultation and feedback and provide input into planning and design outcomes and impact on community interests and amenity.
- 5.66 End users of water for irrigation purposes and community consultant groups were engaged in the consultation process for the project. The Sullivans Creek Catchment Group and potential irrigators were supportive of the project.
- 5.67 Departmental consultation with stakeholders in relation to the Flemington Road Ponds Project took place at the planning stage with potential end-users and community and agency representatives participating in the discussions. Community input was obtained and potential customer demand assessed with stakeholders being encouraged to provide feedback that would inform the project through detailed design and construction. The community was encouraged to participate in environment related activities to enhance amenity in relation to the ponds.
- 5.68 The ACT Annual Water Reports published by DECCEW provide information to the public with regard to water related issues in the ACT.
- 5.69 These reports provide comment on the way in which the ACT community use the waterways, for recreation and irrigation and inform the public on the implementation of *Think water, act water*.
- 5.70 The Water Reports for 2007-08 and 2008-09 include CIUWP and Flemington Road Ponds Project information and were available to the public.²⁷ Both these reports incorrectly stated that the Flemington Road Ponds Project was completed in 2007-08 and 2008-09 respectively. Audit notes, as described above, that construction of only one of the two proposed ponds was completed in 2007-08. The second pond, and the project was not completed until 2009-10.

CONCLUSION

- 5.71 As a pilot project, the Flemington Road Ponds Project allowed opportunities for issues like asset ownership, management of infrastructure, cost recovery and pricing of non-potable water to be addressed. These issues were being progressed but were not resolved at the completion of the project. As at June 2010, the pilot project had been completed for nine months and \$50 million of ACT Government appropriations for related stormwater projects were approved.
- 5.72 Governance arrangements put in place according to the Funding Deed were partially maintained throughout the construction of Flemington Road Ponds Project. The communication to the Commonwealth on progress and variations still occurred. Since June 2008, the meetings of key ACT Government agencies as a part of the governance arrangements, did not occur or were not frequent, and

²⁷ < http://www.environment.act.gov.au/water/act_water_reports >

Flemington Road ponds project

this increased the risks that all key agencies were not properly informed and/or consulted on the projects.

- 5.73 The Flemington Road Ponds Project was the first stage of a larger project to provide non-potable water to sportsgrounds and recreational areas (that is, the CIUWP). The Flemington Road ponds are not yet supplying non-potable water to end users, and none of the expected water savings from the CIUWP has been delivered as originally intended (1.5 GL of non potable water by 2010). DECCEW expects the supply of non-potable water to occur in 2011. As a result of a variation to the Funding Deed, the CIUWP target of 3 GL supply is now not due to be delivered until 2015.
- 5.74 The Funding arrangements established between the Commonwealth and ACT Governments included an 'in-kind' contribution from the ACT of more than \$1 million. The Funding Deed also included \$3.3 million to be raised from property developers to incorporate stormwater into ponds for stormwater harvesting. This developer contribution scheme has not been progressed and none of the \$3.3 million has been raised. As a result, the ACT Government will need to cover this \$3.3 million shortfall.

APPENDIX A: AUDIT CRITERIA, METHODOLOGY AND APPROACH

AUDIT CRITERIA

Audit assesses the administration and management of various water saving programs against the following audit criteria:

Governance issues

- The governance framework is suitably structured to deliver the water initiatives;
- Agencies have a clear understanding of roles, responsibilities and accountability for the administration of the initiatives.

Administration

- Water initiatives:
 - are well defined / well researched;
 - have clear objectives;
 - have an agreed set of performance measures in place;
 - meet the policy requirements at both national and state levels;
 - consider benefits and costs; and
 - incorporate reviews and areas for improvement.

Public awareness and education programs

- There are documented policies and procedures in place to guide the delivery of services;
- Information and facts sheets are delivered to the community and targeted appropriately; and
- Community consultation occurs and is considered and incorporated (where appropriate).

Implementation

- Water initiatives are delivered in a cost effective and timely manner.
- There are mechanisms in place to collect and process stakeholder feedback.
- Performance measures and other relevant data, such as financial information is recorded, tracked and monitored against agreed measures and targets.

Reporting and review

- Reporting mechanisms are clearly defined and are in place;

Audit criteria, methodology and approach

- Accurate and reliable reports are provided to management and are produced within the specified time frame(s); and
- Water initiatives are reviewed for their appropriateness and effectiveness through selected mechanisms such as customer satisfaction surveys, data analysis on water savings and cost/benefit analysis.

AUDIT METHODOLOGY AND APPROACH

The audit approach included a combination of quantitative and qualitative analysis, file and documentation reviews and interviews with DECCEW and ACTEW (as the lead agencies) and CMD, ActewAGL, and ACTPLA, where relevant.

Information and evidence to support the audit opinion and report was gathered through:

- interviewing key staff at DECCEW, ACTEW, CMD, ActewAGL and ACTPLA;
- examining relevant documentation, including strategic plans, risk management plans, performance information, policies and guidelines, reports, studies, strategies and reviews relating to the selected ACT Government initiatives;
- identifying timelines and resources used in the implementation of the selected initiatives; and
- identifying potential areas for improvement.

APPENDIX B: DAM STORAGE

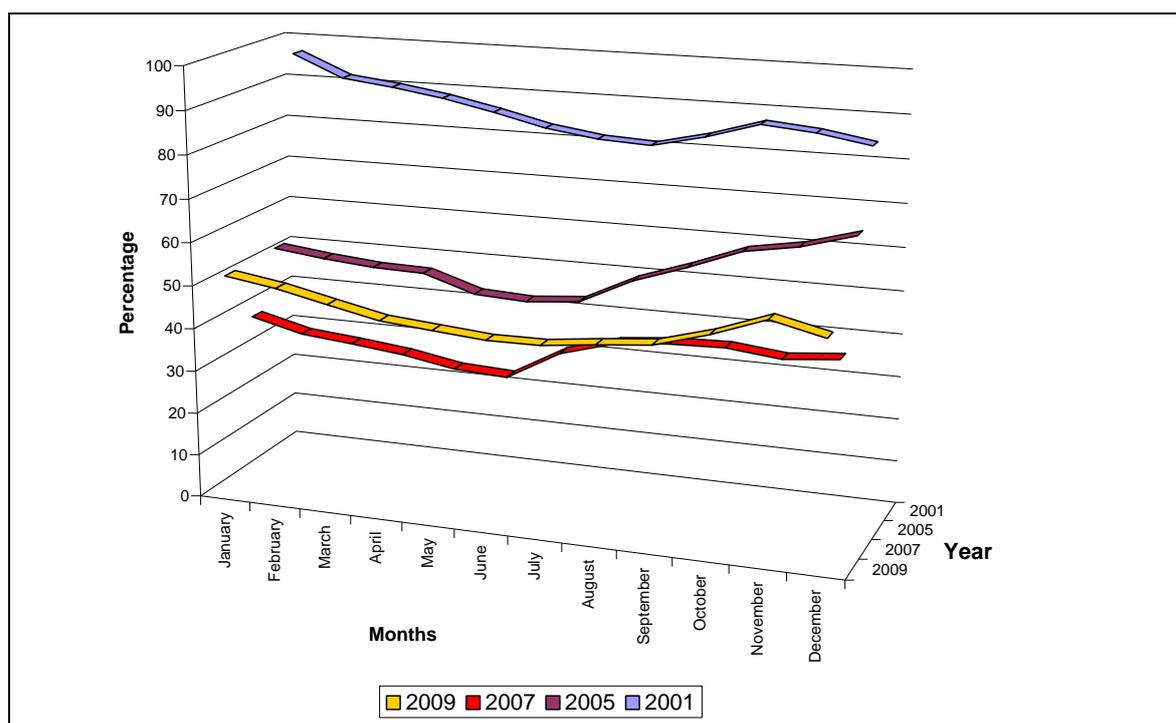
The region's available water is stored in four dams; the Cotter, Bendora, Corin and Googong dams. The dams have a current total storage capacity of 207.4 GL. Storage levels are reported as an average of the storage of the four dams.

Current storage levels (at March 2010) are around 50 percent of capacity (112 GL), and are well below the level of 2001.

The graph below shows the dam storage levels for 2001, 2005, 2007 and 2009. These years were selected on the following basis: 2001 reflects the highest dam levels; 2007 saw the lowest; 2005 was the mid-year of the data; and 2009 was the most current year at the time of the audit.

Between January 2001 and December 2009, dam levels were at their highest in January 2001, at 96.6 percent, and lowest in 14 June 2007 at just 30.8 percent.²⁸ The June 2007 lowest average was the lowest on record. Records have been kept since 1817.

Figure B-1: Dam levels for 2001, 2005, 2007 and 2009 (average storage percentages)



Source: ACT Auditor-General's Office based on ActewAGL data.

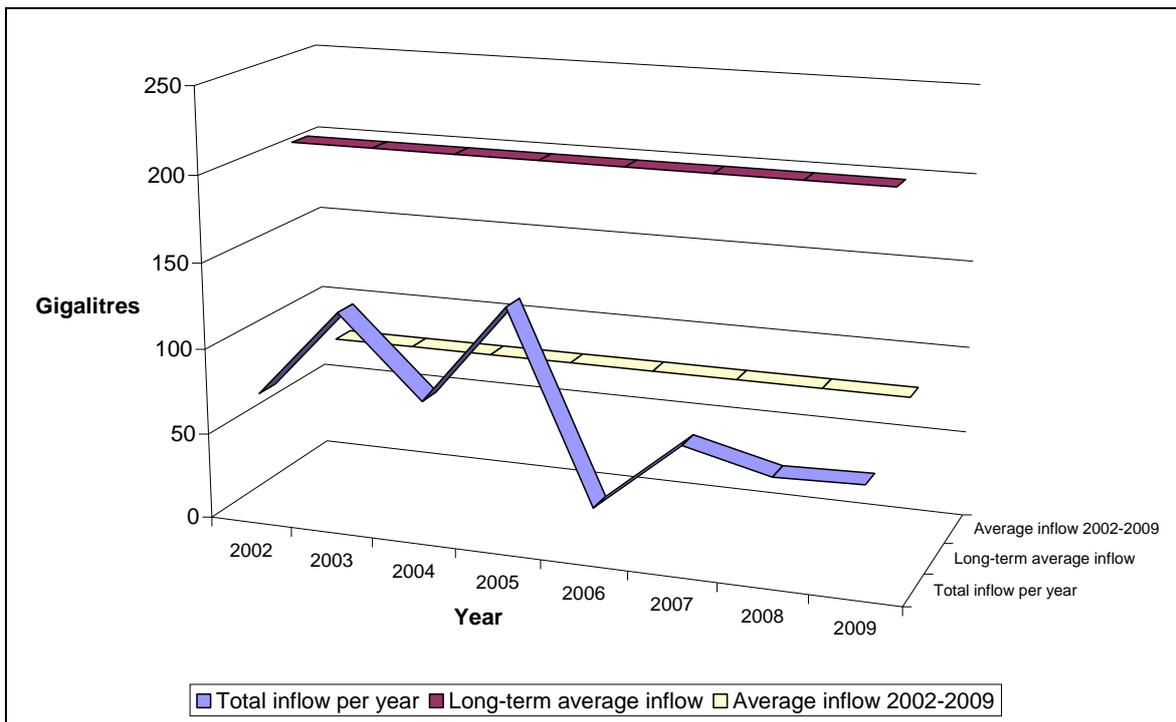
²⁸ ActewAGL Annual and Sustainability Report 2008, publications@actewagl.com.au, Canberra, p 6.

APPENDIX C: INFLOWS

Inflows are the transfer of both surface water run-off and deep drainage to ground water that flow into a defined water system, for example a dam.

The region's average long-term annual inflows are about 208 GL, calculated over the period from 1871 to 1993. Inflows over recent years, however, have been well below the long-term average. The average annual inflows for the period from January 2002 to December 2009 was 78 GL, and inflows for 2006 were the lowest on record at 26 GL.

Figure C-1: Comparison in 2002 to 2009 Canberra inflows with long-term average



Source: ACT Auditor-General's Office analysis of ACTEW data, Reservoir inflows by month (Jan 2002-Oct 2009).

APPENDIX D: COMPARISON OF STAGES OF WATER RESTRICTIONS

The following table summarises the scheme of temporary restrictions on the use of potable water ('drinking' or 'tap' water) from ACTEW's water supply system. Non-potable sources are not restricted in the table below. The scheme is approved under the *Utilities (Water Conservation) Regulation 2006*.

Private gardens and lawns: commercial nurseries, market gardens and turf-growing businesses	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Sprinkler and irrigation systems to between 6pm and 9am on any day. • A hand-held hose fitted with a trigger nozzle, a bucket or watering can may be used at any time. • At all times gardens and lawns may only be watered without causing pooling or runoff.
Stage 1	<ul style="list-style-type: none"> • Sprinkler and irrigation systems to be used between 7am and 10am or 7pm and 10pm on alternate days as per the 'odds and evens' system. • Other two points the same as Permanent Water Conservation Measures.
Stage 2	<ul style="list-style-type: none"> • No sprinkler or other irrigation system, other than a dripper system may be used. • A hand held hose fitted with a trigger nozzle, a bucket or a watering can or a dripper system may be used to water lawns and plants between 7am and 10am and between 7pm and 10pm on alternate days as per the 'odds and evens' system. • At all times gardens and lawns may only be watered without causing pooling or runoff.
Stage 3	<ul style="list-style-type: none"> • Stage 2 with the exception that water lawns is not permitted
Stage 4	<ul style="list-style-type: none"> • External watering of lawns and plants only permitted using non-potable water.
Lawns and plants at parks, sports amenities, golf courses and public gardens	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Sprinkler and other irrigation systems can be used only between 6pm and 9am on any day • A hand-held hose fitted with a trigger nozzle, a bucket or a watering can may be used at any time. • At all times lawns and plants may only be watered without causing pooling or runoff.
Stage 1	<ul style="list-style-type: none"> • The target of 10 percent reduction in water use should be met • At all times lawns and plants may only be watered without causing pooling or runoff.
Stage 2	<ul style="list-style-type: none"> • As per Stage 1 except a 25 percent reduction in water use should be met.
Stage 3	<ul style="list-style-type: none"> • As per Stage 1 except a 35 percent reduction in water use should be met.
Stage 4	<ul style="list-style-type: none"> • External watering of lawns and plants only permitted using non-potable water.

Paved areas	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • A bucket and mop or high-pressure low-volume cleaner can be used to clean paved areas at any time. • Otherwise, water must not be used to clean paved areas unless cleaning is necessary as a result of accident, fire, health hazard or other emergency.
Stage 1	<ul style="list-style-type: none"> • Water must not be used to clean paved areas unless necessary as a result of accident, fire, health hazard or other emergency.
Stage 2	<ul style="list-style-type: none"> • As per Stage 1
Stage 3	<ul style="list-style-type: none"> • As per Stage 1
Stage 4	<ul style="list-style-type: none"> • As per Stage 1
Private ponds and fountains	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • N/A (no restrictions)
Stage 1	<ul style="list-style-type: none"> • Only fountains that recirculate water may be operated and they may be topped up only by using a hand-held hose fitted with a trigger nozzle, a bucket or a watering can. • Ponds may only be topped up using a hand-held hose fitted with a trigger nozzle, a bucket or a watering can
Stage 2	<ul style="list-style-type: none"> • Fountains must be switched off. • Ponds as per Stage 1
Stage 3	<ul style="list-style-type: none"> • Fountains as per Stage 2 • Only ponds that support fish may be topped up, and then only using a hand-held hose fitted with a trigger nozzle, a bucket or a watering can.
Stage 4	<ul style="list-style-type: none"> • Fountains as per Stage 2 • Ponds as per Stage 3
Public ponds and fountains	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Not applicable (no restrictions)
Stage 1	<ul style="list-style-type: none"> • Existing ponds must not be filled up or topped up other than with non-potable water. • Only existing fountains that recirculate water may be operated and they may be topped up only with non-potable water. • New ponds and fountains may not be filled with any water or used.
Stage 2	<ul style="list-style-type: none"> • As per Stage 1
Stage 3	<ul style="list-style-type: none"> • Existing ponds as per Stage 1 • New ponds as per Stage 1 • No fountains may be operated or filled or topped up with any water.
Stage 4	<ul style="list-style-type: none"> • Ponds must not be filled or topped up with any water. • Fountains as per Stage 3.

Private swimming pools	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Not applicable (no restrictions)
Stage 1	<ul style="list-style-type: none"> • Existing pools must not be either emptied or refilled without written exemption. • Any pool not previously filled must not be filled without written exemption. • Previously filled pools may be topped up using hand-held hose.
Stage 2	<ul style="list-style-type: none"> • Existing pools as per Stage 1. • Previously filled pools must not be topped up without a written exemption unless: <ul style="list-style-type: none"> –The pools is covered when not in use; and –Topping up is undertaken with a hand-held hose only between 7 am to 10 am or 7 pm to 10 pm on alternate days as per the ‘odds and evens’ system.
Stage 3	<ul style="list-style-type: none"> • Pools must not be emptied, filled or topped up without written exemption.
Stage 4	<ul style="list-style-type: none"> • As per Stage 3.
Public swimming pools	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Not applicable (no restrictions)
Stage 1	<ul style="list-style-type: none"> • Existing pools must not be either emptied or refilled without written exemption but may be topped up. • Any pool not previously filled must not be filled without written exemption.
Stage 2	<ul style="list-style-type: none"> • As per Stage 1
Stage 3	<ul style="list-style-type: none"> • Pools may not be emptied, filled or topped up without written exemption.
Stage 4	<ul style="list-style-type: none"> • As per Stage 3
Water storage tanks, dams and lake	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Not applicable (no restrictions)
Stage 1	<ul style="list-style-type: none"> • Must not be filled or topped up other than with non-potable water.
Stage 2	<ul style="list-style-type: none"> • As per Stage 1
Stage 3	<ul style="list-style-type: none"> • As per Stage 1
Stage 4	<ul style="list-style-type: none"> • As per Stage 1
Vehicles	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • If not washed at a commercial car wash, any vehicle should be washed on a lawn or other porous surface wherever practicable and then may only be washed by using: <ul style="list-style-type: none"> –A bucket or watering can; –A high-pressure low-volume cleaner; or –A hand-held hose fitted with a trigger nozzle. • Boat motors may be flushed or rinsed after use.

Stage 1	<ul style="list-style-type: none"> • As per Permanent Water Conservation Measures • No restrictions on commercial car wash operations.
Stage 2	<ul style="list-style-type: none"> • As per Permanent Water Conservation Measures • Any vehicle may be washed at a commercial car wash only if it recycles water and holds an exemption allowing use of potable water.
Stage 3	<ul style="list-style-type: none"> • No washing of any vehicle except at a commercial car wash that recycles water and holds an exemption allowing use of potable water. • Boat motors as per Permanent Water Conservation Measures.
Stage 4	<ul style="list-style-type: none"> • No vehicle washing. • Boat motors as per Permanent Water Conservation Measures.
Windows and buildings	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Windows may be washed or gutters cleaned at any time. • Other parts of a building may be washed at any time by using a bucket and mop/brush or a high-pressure low-volume cleaner, unless cleaning is necessary as a result of accident, fire, health hazard or other emergency.
Stage 1	<ul style="list-style-type: none"> • Windows and buildings can be washed at any time but only using a bucket and mop, squeegee or brush or with a high-pressure low-volume cleaner. • Otherwise, water must not be used unless necessary as a result of accident, fire, health hazard or other emergency. • Building Gutters may be cleaned at any time.
Stage 2	<ul style="list-style-type: none"> • No washing unless necessary as a result of accident, fire, health hazard or other emergency, provided that building gutters may be cleaned at any time.
Stage 3	<ul style="list-style-type: none"> • As per Stage 2
Stage 4	<ul style="list-style-type: none"> • As per Stage 2
Construction and related activities	
Permanent Water Conservation Measures	<ul style="list-style-type: none"> • Water can only be used for dust or other pollutant suppression by means of a hose fitted with a flow cut-off device or a vehicle fitted with sprinklers. • Unless impracticable, water may only otherwise be used by means of a hose fitted with a flow cut-off device. • Wherever practicable non-potable water should be used.
Stage 1	<ul style="list-style-type: none"> • As per Permanent Water Conservation Measures
Stage 2	<ul style="list-style-type: none"> • Unless impracticable, water may only otherwise be used by means of a hose fitted with a flow cut-off device. • Wherever practicable non-potable water should be used.
Stage 3	<ul style="list-style-type: none"> • As per Stage 2
Stage 4	<ul style="list-style-type: none"> • Only non-potable water should be used unless otherwise exempted in writing.

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