

Report

Central Tablelands Water
Weddin Shire Council
Blayney Shire Council
Cabonne Shire Council

Joint Integrated Water Cycle Management (IWCM)
Detailed Strategy Study

June 2013



HydroScience Consulting
STRATEGIC WATER SOLUTIONS



Central Tablelands Water

Weddin Shire Council

Blayney Shire Council

Cabonne Shire Council

Job Number A204

Joint Integrated Water Cycle Management Detailed Strategy Study

HydroScience Consulting

A.B.N. 79 120 716 887

Level 5, 350 Kent Street

Sydney NSW 2000

Telephone: (02) 9249 5100

Facsimile: (02) 9279 2700

Email: hsc@hydroscience.net.au



Document Control

			Approved for Issue		
Revision	Author	Reviewer	Name	Signature	Date
3	SLA	AFR	Andrew Fraser		June 2013

© Central Tablelands Water, Blayney Shire Council, Weddin Shire Council and Cabonne Shire Council 2013

This document incorporates the comments of NSW Water received in April 2013. This document was prepared for the four Councils as an IWCM Study by HydroScience Consulting. HydroScience only authorises the use of this document for this purpose by these Councils. Use by any other party for any other purpose in any form is not authorised by HydroScience.

Executive Summary

Integrated Water Cycle Management (IWCM) is a strategy planning tool for local water utilities developed by the NSW Office of Water.

Central Tablelands Water together with Weddin, Blayney and Cabonne Shire Councils has completed a Joint IWCM Detailed Strategy Study. The Strategy Study developed a group of solutions called scenarios to address IWCM issues relating to service delivery for urban water supply and sewerage over the next 30 years.

The four Councils previously developed a Joint IWCM Evaluation Study that identified IWCM issues. For all four councils, issues were identified which would require significant capital works within 10 years. For this reason, detailed strategies were required for all four councils.

HydroScience's sub-consultant SMEC prepared reviews of Safe Yield of Lake Rowlands and Safe Yield of Molong Creek Dam and Borenore Dam. These reviews were completed as part of the Data Gap Action Plan prior to the development of this Joint IWCM Detailed Strategy Study. These reports provided essential analytical background information for this Joint IWCM Detailed Strategy Study.

A Project Reference Group (PRG) was established made up of key stakeholders. The PRG met twice and has recommended a preferred scenario (themed group of options) for each Council.

Action implementation, recommendations and proposed timeframes for scenario implementation were developed to address issues for each Council. A revised Data Gap Action Plan is also provided. The preferred scenarios for each Council were assessed in PRG meeting 3 based on the Triple Bottom Line (TBL) criteria developed in PRG meeting 2. The preferred scenarios recommended actions are as shown in the following sections.

Central Tableland Water

Recommendations to address CTW's IWCM remaining issues are summarised in the following table:

CTW IWCM Issues		Recommended Actions	Estimated TRB Impact (\$/year per property)
4	Central Tablelands Future Water Security	<p>Low level demand management Demand Management Package 1 which includes:</p> <ul style="list-style-type: none"> ▪ National Mandatory Water Efficiency Labelling Scheme (WELS), ▪ Community Education, ▪ Permanent Low Level Restrictions on Water Use (Water Conservation Measures), ▪ BASIX – Fixture Efficiency with Rainwater Use. <p>Surface Water Option to construct a river off take at Blayney Blue Hole and connect new pipelines to Blayney Water Filtration Plant</p> <p>Note: NSW Office of Water advised that CTW Demand Management Plan consumption per capita per day for indicate a figure of 398 litres per capita per day. This is high compared to state average of less than 200 litres per capita per day. Low level demand management will reduce this figure to 362 litres per capita per day while high level demand management will reduce this further to 353 litres per capita per day. CTW should ensure that demand management programs are in place for Weddin and Blayney to improve water savings. CTW should also investigate water losses/leakage more closely as this could be the factor pushing up consumption values. Leakage aspects have not been discussed.</p>	\$4
SS8-CTW	<p>Some Levels of Service targets from the CTW Management Plan 2007 were not met.</p> <ul style="list-style-type: none"> ▪ Maximum frequency of unplanned consumer disruptions ▪ Compliance with 2004 ADWG – total coliforms and thermo-tolerant coliforms 	Modify CTW Strategic Business Plan level of service targets and implement revised actions.	No cost

CTW IWCM Issues		Recommended Actions	Estimated TRB Impact (\$/year per property)
SS9-CTW	In 2005/06 CTW's performance was below the NSW median for: % population without reticulated water Water quality compliant	Prepare a water supply strategy study including water supply to the five villages (Newbridge, Barry, Neville, Caragabal, and Bimbi) and Implement proposed actions in study developed to address issues identified in the IWCM Studies.	\$0.20
SS11-CTW	Macro water plans for unregulated rivers in the region will establish water sharing rules between competing users including the environment.	Evaluate the impact of the relevant water sharing plans to be completed shortly.	No cost
SS13-CTW	Groundwater security.	Liaise with NSW Office of Water to develop a formalized long term groundwater security agreement that, based on groundwater yield study specifically provides for CTW to have urban water priority access to groundwater for the next 30 years.	No cost
SS14-CTW	Future non-urban demand particularly from gold mining in Blayney Shire.	Council to incorporate future non-urban demand (including gold mining in Blayney Shire) in the next IWCM.	No cost
SS15-CTW	Grenfell relies on the pipeline from Gooloogong for its water supply and would be at risk if the pipeline failed.	Replace Gooloogong pipelines	\$26
SS16-CTW	Bimbi and Caragabal are not connected to reticulated water	(included in SS9-CTW)	No cost
Total TRB Increment (\$/year per property):			\$30.20

These actions have a combined impact of \$30.20 increment on CTW's typical residential bill (water) per year.

Weddin Shire Council

Recommendations to address WSC's IWCM remaining issues are summarised in the following table:

WSC IWCM Issues		Recommended Actions	Estimated TRB Impact (\$/year per property)
6	Greenethorpe is not sewered	Construction of CEDs & Local STP at Greenethorpe and at Quandialla	\$65
7	Quandialla is not sewered		
SS17-WSC	<p>Level of service targets not met in 2004:</p> <ul style="list-style-type: none"> ▪ Category one system failures due to rainfall and deficient capacity, ▪ Category three system failures due to blockages, ▪ Response times to priority one incidents during working hours and to general or minor customer complaints and inquiries. 	Review WSC SBP level of service targets	\$4.23
SS18-WSC	Bimbi and Caragabal are not connected to sewerage service.	Prepare Feasibility Studies on sewerage service for Bimbi and Caragabal and implement the proposed actions in the plan to address issues identified in the IWCM Studies.	\$0.90
SS19-WSC	Council estimates that Grenfell STP upgrade will be necessary in 2020 but this is based on condition of assets and changes in DECCW requirements in the future.	Prepare an Investigation Study to extend the Grenfell STP lifespan	\$1.70
SS20-WSC	There is no Asset Management Plan or Emergency Plan for the Grenfell STP.	Prepare an Asset Management Plan and an Emergency Plan for the Grenfell STP. Implement proposed actions in plans developed to address issues identified in the IWCM Studies.	\$0.60
SS21-WSC	Meeting reuse guidelines now and in the future at Grenfell.	Prepare Section 60 application & approval for effluent reuse and install a UV/ chlorine disinfection system at the Grenfell STP	\$1.70
SS22-WSC	The Capital Works Plan for sewerage and drainage services does not match the 2004 Strategic Business Plan.	Update WSC Capital Works Plan as part of SBP (included in SS17-WSC)	No cost
Total TRB Increment (\$/year per property):			\$74.13

These actions have a combined impact of \$74.13 increment on WSC's typical residential bill (sewerage) per year.

Blayney Shire Council

Recommendations to address BSC's IWCM remaining issues are summarised in the following table:

BSC IWCM Issues		Recommended Actions	Estimated TRB Impact (\$/year per property)
1	Unsewered villages: Lyndhurst is not seweraged	Build Lyndhurst STP to receive additional sewage from Mandurama & Carcoar with no reuse	\$68
2	Unsewered villages: Mandurama is not seweraged		
3	Unsewered villages: Carcoar is not seweraged		
SS2-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> ▪ Pump power 	Develop sewerage service emergency power backup systems.	\$0.40
SS3-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> ▪ Blockages and collapses 	Prepare an investigation study on sewerage pipes replacement	\$2.20
SS4-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> ▪ Response times for system failures after working hours` 	Review sewerage service SBP level of service targets	No cost
SS5-BSC	Areas where DECCW Best Practice Management Guidelines are not met (LOS): <ul style="list-style-type: none"> ▪ Development Servicing plan (DSP) – not completed 	Prepare Development Servicing Plan BSC advised in June 2013 that the DSPs for Blayney and Millthorpe are in place and operational. A proposed review of the DSPs will be undertaken as part of Centroc Water Utilities Alliance program in 2013/14	\$0.04
SS6-BSC	Wet weather inflow and illegal connections at Blayney STP	(Included in SS3-BSC)	No cost
Total TRB Increment (\$/year property):			\$70.64

These actions have a combined impact of \$70.64 increment on BSC's typical residential bill (sewerage) per year.

Cabonne Shire Council

Recommendations to address CSC's IWCM remaining issues are summarised in the following table:

CSC IWCM Issues		Recommended Actions	Estimated TRB Impact (\$/year per property)
8	Water security in Molong Water Supply System	<p>Low level demand management Demand Management Package 2 which includes:</p> <ul style="list-style-type: none"> ▪ National Mandatory Water Efficiency Labelling Scheme (WELS), ▪ Community Education, ▪ BASIX – Fixture Efficiency with Rainwater Use, ▪ System Water Loss Management, ▪ Permanent Low Level Restrictions on Water Use (Water Conservation Measures), <p>Utilisation of Thistle Street Well</p> <p>Utilisation of licensed Molong Creek surface water</p>	\$6
SS23-CSC	CSC's TBL performance in urban population without reticulated water had exceeded the NSW median value in 2005/06. In 2008/09 CSC's TBL performance on this has also exceeded the NSW median value.	Prepare a feasibility study to provide reticulated water supply to Cumnock and Yeoval and implement the proposed actions in the feasibility study to address issues identified in the IWCM Studies.	\$0.60
SS24-CSC	CSC's TBL performance in number of water service complaints per 1000 properties had exceeded the NSW median value in 2005/06. In 2008/09, CSC's TBL performance on this has also exceeded the NSW median value.	Develop an on-going program to replace old water mains in Molong.	\$11
SS27-CSC	Canowindra STP has licence non-compliances from 2003/04 to 2005/06. Monitoring was not complete in 2007/08. There are also 3 incidents of non-compliance in 2009/10.	Prepare an investigation study to review Canowindra STP performance and extend life. Implement proposed actions in the investigation study developed to address issues identified in the IWCM Studies.	\$15

CSC IWCM Issues		Recommended Actions	Estimated TRB Impact (\$/year per property)
SS28-CSC	Reconnection of Lake Canobolas as a water supply for Orange may impact on Molong Creek.	Develop a formal agreement (e.g. memorandum of understanding) between Orange City Council and CSC. The aim of this agreement, from CSC's perspective will be to ensure Molong Creek Dam Yield is unaffected by OCC's abstractions from Lake Canobolas. It is likely a technical and legal review of issues will be required.	\$0.80
SS29-CSC	Water security and water sharing: <ul style="list-style-type: none"> ▪ Land use change ▪ High intensity agriculture ▪ Mining developments and water demand ▪ Groundwater ▪ Water demand by neighbouring Orange 	Refer to Centroc Water Security Study. No action.	No cost
SS30-CSC	Water security: <ul style="list-style-type: none"> ▪ The effect of growth in Orange on the catchment downstream ▪ The water demand of Cadia mine (Cadia has two dams, one will be enlarged if approval granted) 	Refer to Centroc Water Security Study. No action.	No cost
SS31-CSC	Regular flooding of Molong impacting Molong pumping station.	Proceed to complete Molong Flood Plain Management Plan and implement proposed actions in the plan developed to address issues identified in the IWCM Studies.	No cost
SS32-CSC	Growth in Orange will have an important influence on the Molong Creek Dam inflows region. Orange is addressing the severe water shortage in a number of ways. Two of these possible prospects include: <ul style="list-style-type: none"> ▪ Stormwater harvesting (2000 ML/year) ▪ Reconnecting Lake Canobolas 	(included in SS28-CSC)	
Total TRB Increment (\$/year per property)			\$33.40

These actions have a combined impact of \$18.40 increment on CSC's typical residential bill (water) and \$15.00 increment on typical residential bill (sewerage) per year.

Regional Water Security

The preferred scenarios for Central Tablelands Water and Cabonne Shire Council were with the Centroc Water Security Study preferred strategy F2a options.

Central Tablelands Water's preferred scenario is expected to provide sufficient extra water supply for Central Tablelands up to 2034 without the need to augment Lake Rowlands' capacity. However, from the Centroc regional water security perspective, CTW's IWCM preferred scenario will not address Centroc regional water security needs.

Central Tablelands Water's preferred scenario would be in line with Centroc Water Security Study's Cowra pipeline option provided that Lake Rowlands Augmentation takes place.

Cabonne Shire Council's preferred scenario recommended action to develop a feasibility study for water supply to Cumnock and Yeoval appears to be in line with the Centroc Water Security Study.

However, Centroc proposed Orange-Molong Creek Pipeline's 2-way transfer system appears to be surplus to the CSC's needs addressed by the IWCM preferred scenario. The option to supplement Orange's water supply would also affect Molong's water security if this option proceeded without Lake Rowlands Augmentation taking place.

Contents

- Executive Summary2**

- 1 Introduction..... 13**
 - 1.1 The IWCM Process 13
 - 1.2 Overview 13

- 2 This Strategy Study 16**
 - 2.1 Issues 16
 - 2.2 Safe Yield Assessments..... 16
 - 2.3 Technically Feasible Options & Scenario Development 17
 - 2.4 Triple Bottom Line Assessment (Social, Environmental & Economic Criteria)..... 17
 - 2.5 Typical Residential Bill..... 19
 - 2.6 Preferred Scenarios 20
 - 2.7 Detailed Strategy Study Outcomes..... 20

- 3 Central Tablelands Water21**
 - 3.1 Lake Rowlands Safe Yield Analysis 21
 - 3.2 Scenario Analysis 24
 - 3.3 Outcomes 33
 - 3.4 Action Implementation 35
 - 3.5 Monitoring 35
 - 3.6 Recommendations..... 35

- 4 Weddin Shire Council.....36**
 - 4.1 Scenario Analysis 36
 - 4.2 Outcomes 42
 - 4.3 Action Implementation 44
 - 4.4 Monitoring 44
 - 4.5 Recommendations..... 44

- 5 Blayney Shire Council.....45**
 - 5.1 Scenario Analysis 45
 - 5.2 Outcomes 50
 - 5.3 Action Implementation 52
 - 5.4 Monitoring 52
 - 5.5 Recommendations..... 52

6	Cabonne Shire Council.....	53
6.1	Molong Creek Dam & Borenore Creek Dam Safe Yield Analysis	53
6.2	CSC Scenario Analysis	53
6.3	Outcomes	66
6.4	Action Implementation	69
6.5	Monitoring	69
6.6	Recommendations.....	69
7	Regional Water Security - Centroc Perspective.....	70
7.1	Centroc Preferred Strategy.....	70
7.2	Centroc Preferred Scenario that Overlaps IWCM Options.....	73
7.3	Discussion	76
Appendix A.....		
	IWCM Inception Meeting.....	
Appendix B.....		
	Review of Safe Yield for Lake Rowlands.....	
Appendix C.....		
	Review of Safe Yield for Molong Creek Dam & Borenore Creek Dam.....	
Appendix D.....		
	Joint IWCM Detailed Strategy Study Technical Note - Options & Costing.....	
Appendix E.....		
	PRG Workshop 2 Meeting Minutes	
Appendix F.....		
	PRG Workshop 3 Meeting Minutes	
Appendix G.....		
	Additional Options	
Appendix H.....		
	Scenario Development Summary	
Appendix I.....		
	Resolved Issues.....	

Appendix J

IWCM Data Gaps Action Plan

1 Introduction

This report documents the final outcomes of the joint IWCM project undertaken by Central Tablelands Water and Weddin, Blayney and Cabonne Shire Councils.

In February 2009 Central Tablelands Water together with Weddin, Blayney and Cabonne Shire Councils completed a Joint Integrated Water Cycle Management (IWCM) Evaluation Study. The key outcome of that study was a list of water and sewerage issues that need to be addressed by the Councils. In 2010, the four Local Water Utilities proceeded to develop this Joint IWCM Detailed Strategy Study.

1.1 The IWCM Process

Integrated Water Cycle Management (IWCM) is a 30 year strategic planning tool for Local Water Utilities (LWUs) developed by the NSW Department of Water and Energy (now the NSW Office of Water). IWCM involves assessing three components (water supply, sewerage and stormwater) of the urban water service in an integrated way when identifying all the IWCM issues and developing scenarios to address these issues.

The IWCM process consists of two stages:

- ❑ **IWCM Evaluation:** Lists all LWUs service targets and identifies all the LWUs issues over the next 30 years. It also examines what issues can be addressed by a 'business as usual' scenario (BaUS) (i.e. existing or formally adopted actions and capital works).
- ❑ **IWCM Strategy (this Study):** Developed to address any remaining LWUs issues from the IWCM Evaluation with, in this case, a Detailed Strategy Study. An IWCM Detailed Strategy Study is undertaken where significant capital works are required within 10 years. A scenario is selected from several possible "traditional" or "integrated" scenarios after evaluating each of their social, environmental and economic impacts on the basis of triple bottom line assessments.

The key stakeholders of the IWCM process were represented by the Project Reference Group (PRG). During the Strategy Study stage, the PRG met twice providing comments and assistance. PRG members are identified in the PRG minutes (Appendix E & Appendix F).

1.2 Overview

The 2009 Joint IWCM Evaluation Study developed a list of remaining issues that needed to be addressed by Central Tablelands Water together with Weddin, Blayney and Cabonne Shire Councils.

At the Detailed Strategy project inception meeting in July 2010, these IWCM Evaluation Study issues were reviewed, updated or identified as “resolved” since the completion of the Joint IWCM Evaluation Study (see Appendix A – IWCM Inception Meeting Minutes).

During the Evaluation Study, there were uncertainties relating to:

- ❑ Lake Rowlands;
- ❑ Molong Creek Dam; and
- ❑ Borenore Creek Dam.

A review of this was recommended to be incorporated within the Strategy Study. SMEC was commissioned to develop yield studies. The reports are included in Appendices A, B & C).

The IWCM Detailed Strategy process began with developing options to address the remaining IWCM issues (see Appendix D - Technical Note: Options & Costing).

At the PRG Workshop 2 in December 2010 (see Appendix E – PRG Workshop 2 Meeting Minutes), the PRG identified:

- ❑ a number of technically feasible and Best-Practice compliant options for further scenario development,
- ❑ solutions to address issues when significant capital works are not required within 10 years,

and established

- ❑ the relevant criteria for Triple Bottom Line (TBL) evaluation based on each option’s social, environmental and economic impacts.

At the PRG Workshop 3 in March 2011 (see Appendix F - PRG Workshop 3 Meeting Minutes), the PRG reviewed and agreed on selected scenarios to address each of the remaining issues. Scenarios are themed groups of options. The PRG also recommended Council staff to consider development of common effluent drainage (CED) system options for Greenethorpe and Quandialla in the Weddin Shire Council’s preferred scenario (see Appendix G - Additional Options). The scenario development summary with inclusion of additional options is shown in Appendix H.

Details of the preferred scenarios, actions to be implemented, monitoring to be undertaken and recommendations on areas to be addressed before the next IWCM cycle are included in the IWCM Outcomes & Implementation sections.

Central Tablelands Water, Weddin, Blayney and Cabonne Shire Councils are members of the Central NSW Regional Organisation of Councils (Centroc). In 2009, the Centroc

Water Security Study was completed. It identified an overall strategy to improve water supply security for the Centroc Region. This water supply security strategy was developed from a regional perspective and is therefore significant to the Councils in this Joint IWCM study.

Following a suggestion from the NSW Office of Water and Central Tablelands Water, an additional section discussing the overlap between the regional Water Security Study recommendations and this study was developed (see Section 7 - Regional Water Security - Centroc Perspective).

2 This Strategy Study

2.1 Issues

Issues addressed by a 'business as usual' scenario

IWCM Issues for each of the four Councils and general combined issues were first identified in the Joint IWCM Evaluation Study. Some of the identified issues were addressed by the 'business as usual' scenario (BaUS). The BaUS identifies that Council committed or formally adopted actions have been put in place to address IWCM issues over the next 30 years. Such issues have been dealt with and do not require further analysis in this IWCM Strategy Study.

Remaining Issues

There were a number of remaining issues identified which required further study. The remaining issues have been divided into:

- ❑ Issues where significant capital works are not required within the next 10 years – These issues only require the development of one scenario (solution).
- ❑ Issues where significant capital works are required within the next 10 years – these issues require the PRG to identify a selected scenario from the development of multiple option scenarios.

Resolved Issues

In the period between completion of the Evaluation Study and commencing of the Detailed Strategy Study, some issues were resolved. No scenario was therefore required to address these resolved issues (see Appendix I – Resolved Issues).

Data Gaps

In the Evaluation Study, data gaps were identified where information for determining urban water service issues was not available. In the Evaluation Study, an action plan was developed to address this (see Appendix J). These data gaps need to be addressed before the next IWCM cycle (six years).

2.2 Safe Yield Assessments

The Councils commissioned the SMEC reviews of safe yield for CTW's Lake Rowlands and for Cabonne Shire's Molong Creek Dam and Borenore Dam as part of the Joint IWCM Detailed Strategy Study.

The reports from these studies were:

- ❑ The Review of Safe Yield for Lake Rowlands (Appendix B),
- ❑ The Review of Safe Yield for Molong Creek Dam and Borenore Dam (Appendix C).

The Lake Rowlands safe yield information was crucial for developing appropriate options to address the CTW water security issues. The safe yield information for Molong

Creek Dam and Borenore Dam (which is a backup dam and is currently not in use) provided essential water supply details for developing options to address Molong water security issues in Cabonne Shire.

2.3 Technically Feasible Options & Scenario Development

In the IWCM Detailed Strategy Study, a number of options were developed to address the remaining IWCM issues. Details of these options are included in Appendix D. Each of these options and their estimated costs were presented to the PRG at Workshop 2. The PRG identified the short-listed technically feasible options for Central Tablelands Water, Weddin, Blayney and Cabonne Shire Councils.

Additional options were suggested to address Weddin Shire Council's issues during the PRG Workshops. Alternative sewerage treatment options were then developed and included in Appendix G. With Weddin Shire Council's inputs after PRG Workshop 2, scenario analysis and evaluation were repeated with the inclusion of these additional options.

These technically feasible options were used to develop scenarios. The PRG also identified a list of actions to address each IWCM issue that would not require significant capital works within 10 years.

Non-integrated Solutions

The IWCM Guidelines (Dec 2008) recommended developing "traditional" or "integrated" scenarios to address issues.

The Joint IWCM Strategy Study process was originally expected to address IWCM issues requiring integrated water and sewerage services between Councils. However as the project progressed, integrated options such as offsetting CTW potable water use with Blayney Shire reuse were not deemed technically or financially feasible. This Joint IWCM Detailed Strategy Study has therefore developed single Council scenarios to address IWCM issues for each Council independently.

In this study, a number of integrated and traditional options were developed. Integrated options included:

- Effluent reuse options at Blayney Shire to replace CTW's potable supply.
- Effluent reuse options at Cabonne Shire to increase water security in Molong.

2.4 Triple Bottom Line Assessment (Social, Environmental & Economic Criteria)

At PRG Workshop 2, Triple Bottom Line (TBL) criteria were identified to assess the social, environmental and economic impacts of options and scenarios upon the Local Councils and their communities.

Scenarios were assessed on the basis of their TBL scores, higher TBL scores were considered more favourable.

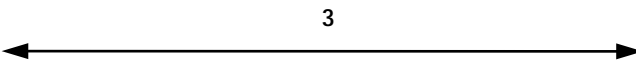


The PRG decided that within the TBL categories each criterion carries the same weighting. The TBL value of each scenario was calculated from:

$$TBL = \frac{\text{Environmental Score} + \text{Social Score}}{\text{Total NPV (\$million)}}$$

2.4.1 Environmental Criteria

The PRG decided that the criteria for the evaluation of environmental impact upon the local region were: E1: river sustainability / water quality, E2: efficiency of water resource usage and E3: energy consumption / greenhouse gas emission. The Environmental TBL criteria details and their scoring indicator definitions are shown in Table 1 below.

Table 1: PRG Agreed TBL Environmental Criteria & Scoring Indicators

TBL Environmental criteria	Scoring Indicators
E1 River sustainability / water quality*	<div style="display: flex; justify-content: space-between; align-items: center;"> 1 3 5 </div>  <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 30%;">Water quality and river sustainability reduced</div> <div style="width: 30%;">No change</div> <div style="width: 30%;">Water quality and river sustainability improved</div> </div>
E2 Efficient use of water resources	<div style="display: flex; justify-content: space-between; align-items: center;"> 1 5 </div>  <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;">Inefficient water resources usage</div> <div style="width: 45%;">Efficient water resources usage</div> </div>
E3 Energy / greenhouse gas emission	<div style="display: flex; justify-content: space-between; align-items: center;"> 1 5 </div>  <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;">High greenhouse gas emission and/or minimum energy efficiency</div> <div style="width: 45%;">Reduced greenhouse gas emission and/or maximum energy efficiency</div> </div>

*Note: For Weddin Shire, the definition of E1 was modified at the request of Weddin Shire Council officers to “E1: river sustainability / water quality (environmental impact)”. This was done in order to clarify the scoring indicators with regard to the impact sewage treatment on the environment.

2.4.2 Social Criteria

The PRG decided that social criteria S1: service supply security & reliability and S2: community amenity, were the crucial criteria to determine the magnitude of the social impact. The Social TBL criteria details and their scoring indicator definitions are shown in Table 2 below.

Table 2: PRG Agreed TBL Social Criteria & Scoring Indicators

TBL Social Criteria		Scoring Indicators		
S1	Services security & reliability	1	3	5
		←-----→		
		Low service supply security & reliability	No change	High service supply security & reliability
S2	Community amenity	1	3	5
		←-----→		
		Negative community amenity effects	No change	Positive community amenity effects

2.4.3 Economic Criterion

The PRG decided total NPV would be the criteria for economic impact. To calculate NPVs, indicative costs were then estimated for each option. Costs of options included capital, operation and maintenance costs. The Net Present Value (NPV) of each option is included in Appendixes A1, B1, C1 and D1.

TBL Economic criterion	
C1	Net Present Value (NPV)

The cost of each scenario has been identified as the sum of all the option costs included in the particular scenario. A common timeframe of 30 years and a discount rate of 7% per annum were assumed for the NPV calculations.

2.5 Typical Residential Bill

The impact of changes resulting from the IWCM process in water supply and sewerage services on the Typical Residential Bill (TRB) has also been estimated on a 30 year basis for each scenario. Unless stated otherwise, these values of potential TRB increments (per property per annum) have been calculated based on the increments being shared across all the customers of a particular Council.

The impact of developer charges on the TRB were assumed minimal as the Councils would levy developer charges on new development under all scenarios.

For this Study, the estimated TRB value was calculated by projecting the number of connected properties recorded in a recent NSW Office of Water TBL Performance Report.

$$\text{TRB} = \frac{\text{Scenario NPV (\$)}}{\text{Average number of connected properties over 30 years}} \times 30 \text{ years}$$

Note: the average number of connected properties over 30 years was estimated by applying the mean value of current and future number of connections. In this report, the current number of connected properties was taken from the Councils' 2008/09 TBL report; the future number of connections was estimated by projecting current value forward 30 years (to 2039) at the growth ratio applied for the DSS Model in the Joint IWCM Evaluation Study.

2.6 Preferred Scenarios

At the PRG Workshop 3, preferred scenarios were recommended to address the remaining issues. The PRG made recommendations of preferred scenarios to be adopted by Councils.

The preferred scenarios combined a selected scenario with the lists of actions to address each IWCM issue that would not require significant capital works within 10 years.

2.7 Detailed Strategy Study Outcomes

Implementation, recommendation and proposed timeframe for each Council's preferred scenario are detailed in the following sections.

The Joint IWCM Detailed Strategy includes the following outcomes for each Council:

- actions to be implemented;
- monitoring to be undertaken; and
- recommendations on areas to be addressed before the next review.

3 Central Tablelands Water

Central Tablelands Water (CTW) has a number of issues that triggered a detailed strategy. A key issue was long term water demand and supply from Lake Rowlands.

3.1 Lake Rowlands Safe Yield Analysis

Lake Rowlands is the major water source for the Central Tablelands water supply. The Centroc Water Security Study proposed to expand Lake Rowlands to 26,310 ML from its current capacity of 4,500 ML. (See Appendix B)

The safe yield of Lake Rowland is estimated to be 1,900 ML per annum under the following assumptions:

- ❑ rainfall reduction by up to ten per cent in 2030 in SE Australia (CSIRO estimation), causing a fifteen to a twenty five per cent reduction in inflows (SMEC's hydrological studies).

The safe yield of the proposed Lake Rowlands augmentation is estimated to be 4600 ML per annum under the following assumption:

- ❑ 5/10/20 rule for water supply security assessment,
- ❑ 25 per cent reduction in daily inflows, and
- ❑ 80/20 environmental flows.

Non-linear Dam Yield to Capacity Relationship

Some members of the PRG questioned the non-linearity of increase in Lake Rowlands safe yield versus the dam capacity.

This is explained in SMEC's safe yield study which stated that the maximum quantity of water that can be "guaranteed" from a reservoir relates to the following factors:

- ❑ Magnitude and variability of inflows:
 - the higher the average inflow the greater the Yield;
 - the higher the year to year variability the lower the Yield;
 - the higher the "within year" variability the lower the Yield;
 - the higher the year to year correlation the lower the Yield.
- ❑ Operational policy:
 - the more variable the demand (e.g. irrigation), the lower the Yield;
 - the higher the environmental flow requirements the lower the Yield;

- Size of storage:
 - the larger the dam the higher the Yield (up to a point);
 - the marginal increase in Yield with storage volume reduces with increasing storage volume;
 - larger storages also usually result in larger evaporation and seepage losses;

- Maximum of long term average (less evaporation and losses).

The following graphs illustrate the relationships of Lake Rowlands yield against storage capacity

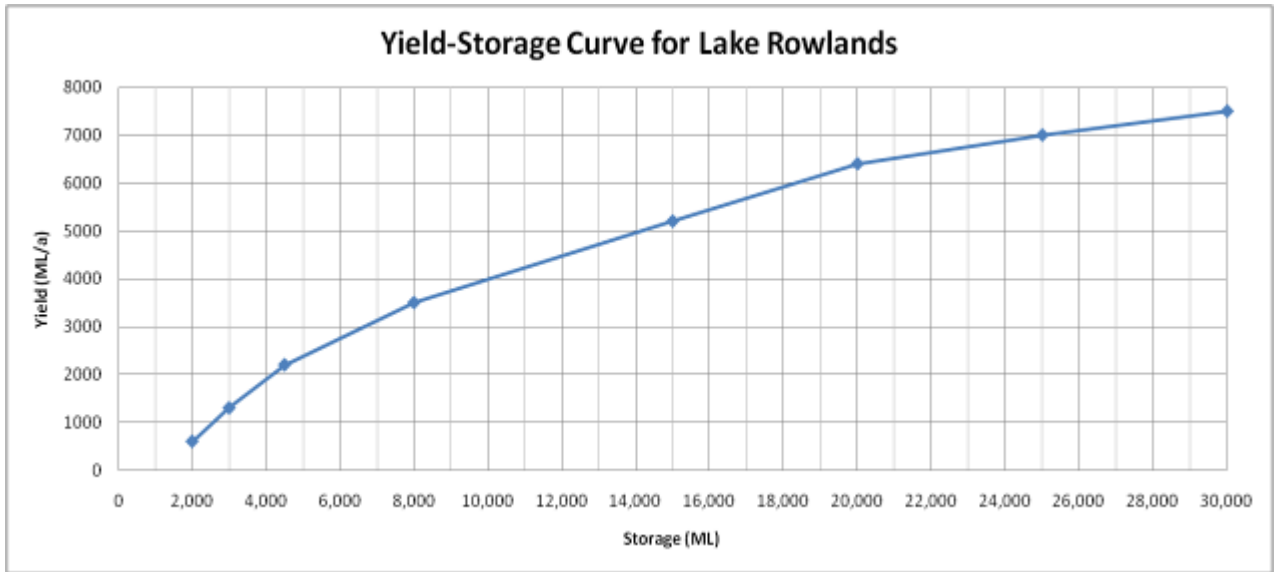


Figure 1: Approximate Yield-Storage Curve for Lake Rowlands

(Source: SMEC Lake Rowland Safe Yield Analysis 2010)

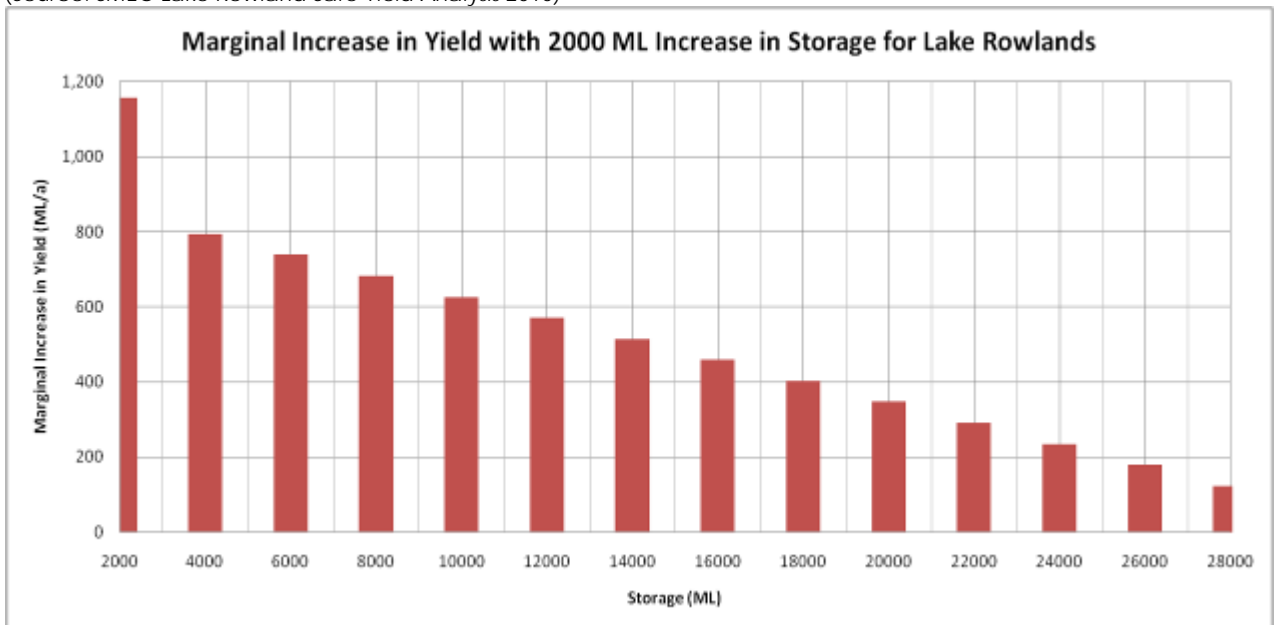


Figure 2: Marginal Increase in Yield with increase in Storage for Lake Rowlands

(Source: SMEC Lake Rowland Safe Yield Analysis 2010)

Based on the CTW baseline demand projection and SMEC's Lake Rowlands safe yield analysis (Appendix B), Central Tablelands water demand would be expected to exceed Lake Rowlands water supply in 2013 (see Figure 3).

CTW Water Demand Projections and Lake Rowlands Safe Yield

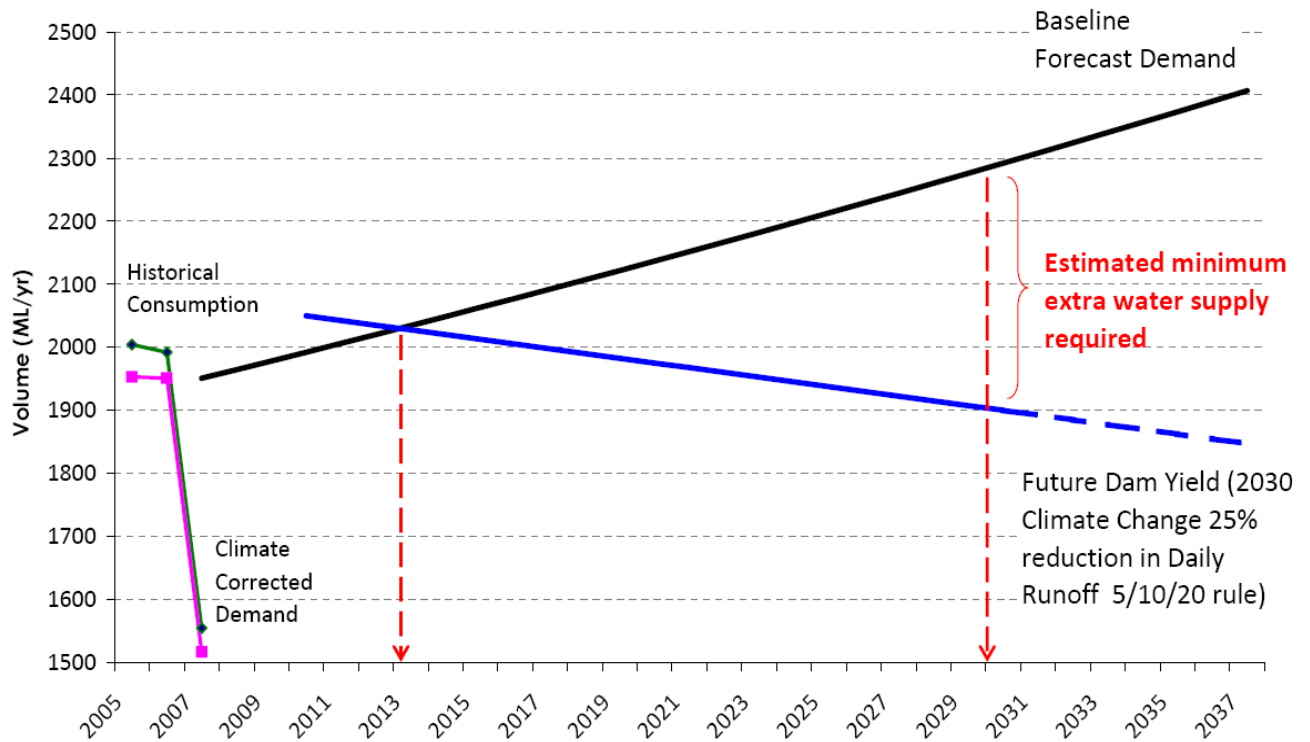


Figure 3: CTW Water Demand Projections & Lake Rowlands Safe Yield

By 2030, a minimum of 392 megalitre per annum additional water supply would be required. A summary of this projection is included in Table 3 below.

Table 3: Central Tablelands Water Future Demand & Supply Projections for 2030

Future Water Demand Estimated Projections	2030 Projected values (ML/year)
CTW's climate corrected annual demand baseline forecast (Source: Central Tablelands Demand Management Plan, HydroScience, Jan 2010)	2292
Lake Rowlands safe yield based on 25% inflow reduction due to climate change (Source: Review of Safe Yield for Lake Rowlands, HydroScience/SMEC, Nov 2010)	1900
Estimated minimum extra water supply requirement in 2030	392

3.2 Scenario Analysis

The scenario development process incorporated factors such as the minimum additional water supply required to overcome the potential water shortage in CTW, option TBL ranking and impact on TRB from each scenario.

The purpose of scenario development was to perform analysis of combinations of options to identify TBL option solutions. The higher the TBL value the more favourable the scenario is considered.

Four scenarios were developed to address CTW's IWCM issues. These scenarios are detailed in the following sections and summarised in Table 8.

3.2.1 Scenario Evaluation

Base Case

The CTW Base Case is based on a "Do Nothing" situation i.e. when CTW would take minimal or no additional action to secure supply to address the minimum estimated future demand shortfall of 392 megalitres per annum by 2030.

In the event that water demand would exceed supply, one of the least favourable options: changing Gooloogong Bore usage from summer peak to full time supply, would be considered as a base case action. This action would make available 400 megalitres per annum which would overcome the water shortage. However this action has unfavorable environmental and economic aspects in being low in energy efficiency and high in operating cost. As a result, "Do Nothing" was not considered by the PRG as a viable scenario to address this IWCM issue.

CTW Scenario 1 - Low Level Demand Management & Surface Water Supply

CTW Scenario 1 was developed on the basis of applying low level demand management and abstraction of surface water from the Blayney Blue Hole. Low Level Demand Management includes a water efficiency labelling scheme, community education, permanent low level water restrictions and BASIX. The utilization of surface water supply from the Blayney Blue Hole involves constructing a river off take and new pipelines connecting to Blayney WFP. This scenario had a high TBL ranking and a low TRB increment (see Table 4).

Table 4: CTW Scenario 1 Option Components

CTW Scenario 1		Low level demand management + surface water supply								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
4O	DM Option Package 1 - water efficiency labelling scheme, community education, permanent low level water restrictions, BASIX	179	5	4	5	3	3	0.11	70.2	1
4M	Utilise Blayney Blue Hole as alternative water supply by constructing off take and pipeline to Blayney WFP.	250	3	5	3	4	4	0.59	12.1	4

CTW Scenario 2 - High Level Demand Management & Surface Water Supply

CTW Scenario 2 was developed on the basis of applying high level demand management. High level demand management includes a water efficiency labelling scheme, community education, permanent low level water restrictions, BASIX, washing machine rebates, shower retrofit and water audits. The utilization of surface water supply from Blayney Blue Hole involves constructing a river off take and new pipelines connecting to Blayney WFP. This scenario also has a high scenario TBL ranking and a low TRB increment (see Table 5).

Table 5: CTW Scenario 2 Option Components

CTW Scenario 2		High level demand management + surface water supply								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
4Q	DM Option Package 3 - water efficiency labelling scheme, community education, permanent low level water restrictions, BASIX, washing machine rebates, shower retrofit, water audits	220	5	5	4	1	1	0.36	15.8	3
4M	Utilise Blayney Blue Hole as alternative water supply by constructing off take and pipeline to Blayney WFP.	250	3	5	3	4	4	0.59	12.1	4

CTW Scenario 3 - Bores Supply Only

CTW Scenario 3 was developed on the basis of using bore supply only to supplement the existing water resources by recommissioning, re-equipping and connecting the Bangaroo Bores. This scenario's TBL ranking and TRB increment are shown in Table 6 below.

Table 6: CTW Scenario 3 Option Components

CTW Scenario 3		Bores supply only								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
4J	Recommissioning, re-equipping and connecting Bangaroo Bores	462	4	4	3	3	3	6.20	1.1	9

CTW Scenario 4 - Dam Augmentation

CTW Scenario 4 comprised expanding Lake Rowlands from 4,500 ML to 26,500 ML based on the Centroc Water Security Study (Aug 2009). This scenario had an extremely high TRB increment which made this the least favourable scenario for CTW to progress alone to address CTW's future water security issues (see Table 7).

Table 7: CTW Scenario 4 Option Components

CTW Scenario 4		Dam augmentation								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
4A	Amplify Lake Rowlands	2700	2	4	3	5	4	165.43	0.05	11

3.2.2 CTW Scenario Comparison

For each scenario, the impact on CTW customer Typical Residential Bill (TRB) was evaluated.

These potential TRB increments were estimated on a base TRB of \$434 per property per annum in CTW in 2008/09 (source: NSW Office of Water TBL Water Supply Performance Report 08/09). A population growth rate of 0.7% was assumed.

Details of the TBL criteria rating for each scenario are included in Table 8. Scenario 1 had the highest scenario TBL ranking and the lowest TRB increment.

Table 8: CTW Scenarios Summary

CTW Scenarios	Description	Included Options	Estimated Additional Supply (ML/year)	Scenario Criteria			Scenario TBL	Scenario Ranking	Increase in TRB (per year)
				Environmental (average)	Social (average)	Economic - overall NPV (\$M)			
Base case		4H Change Gooloogong Bores supply usage	400	3.3	3.0	8.93	0.7	-	\$51
Scenario 1	Low level demand management + surface water	4O DM Management Option 1	429	4.2	3.3	0.70	10.6	1	\$4
		4M Connect Blayney Blue Hole to existing Blayney WFP							
Scenario 2	High level demand management + surface water	4Q DM Management Option 3	470	4.2	2.3	0.95	6.8	2	\$5
		4M Connect Blayney Blue Hole to existing Blayney WFP							
Scenario 3	Bores supply only	4J Recommissioning Bangaroo bores supply	462	3.7	3.0	6.20	1.1	3	\$35
Scenario 4	Dam augmentation	4A Expand Lake Rowlands for CTW supply	2700	3.0	4.5	165.43	0.05	4	\$939

3.2.3 Selected Scenario

The PRG agreed and accepted Scenario 1 as the selected scenario to address the Central Tablelands future water security issue.

Scenario 1 combines the application of low level demand management package 1 with the utilization of the surface water supply from Blayney Blue Hole by constructing a river off take and new pipelines connecting to Blayney WFP.

When water demand reaches supply, additional water resource is needed. Points A, B and C in Figure 4 indicated 3 occasions when this may occur.

Point A shows that CTW's baseline demand forecast would reach the linear projected safe yield of Lake Rowlands in 2013. The selected scenario was therefore developed to address this future water security issue.

Under the assumption when the "low level demand management" option is applied in 2013, water demand would reduce by 179 ML (Demand Management Package 1).

Demand Management Package 1 is comprised of the following water conservation measures. These measures definitions are sourced from the Demand Side Management Decision Support System (DSS) Manual (July 2006):

- National Mandatory Water Efficiency Labelling Scheme (WELS),
- Community Education,
- Permanent Low Level Restrictions on Water Use (Water Conservation Measures),
- BASIX – Fixture Efficiency with Rainwater Use.

The Demand Management Package 1 is applicable to the entire CTW water supply area and would be expected to extend CTW's water supply capacity to 2020 when it levels with the water demand at Point B.

During demand management implementation, there will be a need to examine the impact of each demand management measure to ensure the demand measure water average water saving targets are achieved.

The CSIRO climate change analysis was projected up to year 2030. For the purpose of illustration, the water supply projected values beyond 2030 were assumed to follow a similar linear trend.

When the selected scenario surface water option of "constructing a river off take at Blayney Blue Hole and connecting new pipelines to Blayney Water Filtration Plant" is applied in 2019, i.e. one year before Point B, CTW's water supply would increase by 250 ML. This option would further extend CTW's water supply capacity to 2034 at Point C.

Central Tablelands Water Preferred Scenario Implementation

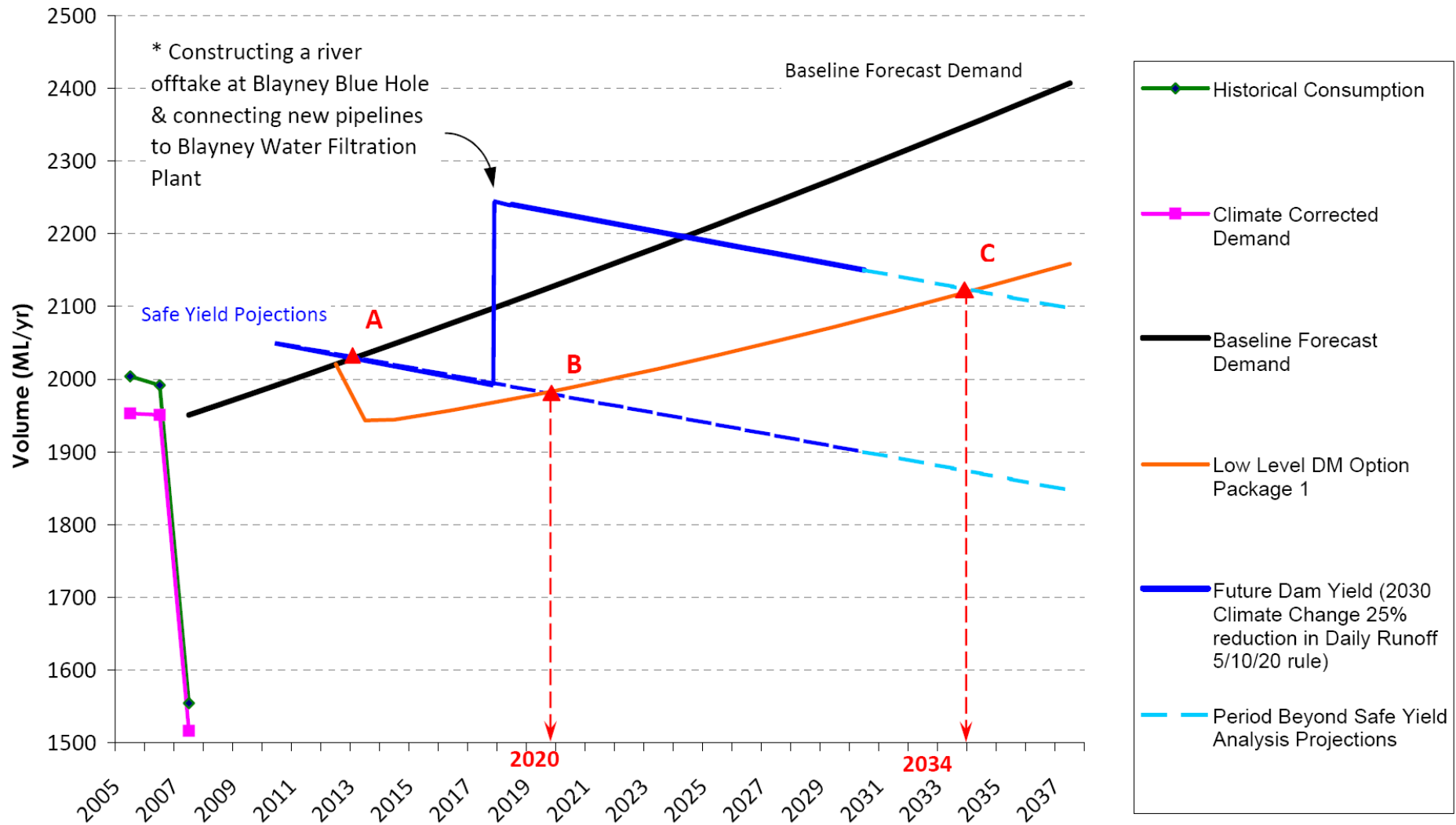


Figure 4: CTW Preferred Scenario Implementation

3.2.4 CTW IWCM Single Solutions

During PRG Workshop 2, the following options were evaluated and accepted to address CTW's IWCM issues which do not require significant capital works within 10 years.

Table 9: CTW Single Solutions

Option No.	CTW IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS8-CTW	<p>Some Levels of Service targets from the CTW Management Plan 2007 were not met.</p> <ul style="list-style-type: none"> Maximum frequency of unplanned consumer disruptions Compliance with 2004 ADWG – total coliforms and thermo-tolerant coliforms 	<p>Based on CTW's 2010 draft SBP, Council's current level of service meets the targets in maximum duration of unplanned supply interruptions to consumers and percentage compliance with 1996 NHMRC/AWRCM Australian Drinking Water Quality Guidelines (ADWG) on total coliforms and thermo-tolerant coliforms.</p> <p>However, Council does not meet the current level of service target in the unplanned frequency of supply interruptions to consumers. But the wide coverage of CTW's services means travel times for staff to address customer service failures are likely to be longer than these for other local water utilities. It is recommended to modify LOS targets in the SBP and implement revised action to reflect this.</p>	\$0	This option has no impact on Council's TRB.
SS9-CTW	<p>In 2005/06 CTW's performance was below the NSW median for:</p> <ul style="list-style-type: none"> % population without reticulated water Water quality compliant 	<p>In some cases connection to the water supply is not economic. A strategy study is recommended to identify the cost of providing water supply through minor capital works for the five villages (Newbridge, Barry, Neville, Caragabal, and Bimbi) within the next 10 years.</p>	<p>Strategy study is approximately \$30K</p> <p>(Note: A preliminary draft estimate of minor capital works would be:</p> <p>Bimbi = \$750K</p> <p>Newbridge, Barry, Neville = \$5M</p> <p>Caragabal = \$1M)</p>	<p>Strategy study TRB = \$0.20</p> <p>(Note: An estimate of total TRB for the minor capital works would be: \$50 funded from CTW water fund and NSW Office of Water subsidy (if available))</p>

Option No.	CTW IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS11-CTW	Macro water plans for unregulated rivers in the region will establish water sharing rules between competing users including the environment.	<p>DECCW intends to fast track water sharing plans for NSW beginning mid-2009 to submit to Murray Darling Basin Authority water planning process. However urban water supply is considered "High Security" by DECCW and it is expected that CTW requirements will be incorporated.</p> <p>NSW Office of Water advised that water sharing plans are currently being developed for the inland water sources. It is anticipated that these plans will be on public exhibition in late 2010 or early 2011. The relevant plans to CTW water supply include:</p> <ul style="list-style-type: none"> ▪ Belubula Regulated and Alluvial, ▪ Lachlan Unregulated and Alluvial, ▪ Macquarie Unregulated and Alluvium. <p>Council will keep a watching brief on this.</p>	\$0	<p>This option has no impact on Council's TRB.</p> <p>(Note: NSW Office of Water identified Water sharing plans and water security issues are mostly factors beyond the control of the water utility, they should therefore not be listed as a major issue)</p>
SS13-CTW	Groundwater security.	<p>Council to liaise with DECCW and develop a formalized long term groundwater security agreement based on technical studies that identify sustainable extraction levels.</p> <p>Refer to Belubula Regulated and Alluvial Water Sharing Plan. This water sharing plan is expected to cover both surface water and groundwater. When Water Sharing Plans are complete, Council should finalize this.</p>	\$0	<p>This option has no impact on Council's TRB.</p> <p>(Note: NSW Office of Water identified Water sharing plans and water security issues are mostly factors beyond the control of the water utility, they should therefore not be listed as a major issue)</p>

Option No.	CTW IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS14-CTW	Future non-urban demand particularly from gold mining in Blayney Shire.	Council advised that potential for new gold mines in the Shire is Increasing. Development of new or existing mines to utilize CTW water is not expected to occur without long term notice. No development actions are in progress at this stage. No possible action required at this stage other than identify future CTW water source (see Options for Issue 4). Future revisions of Best-Practice IWCM may be required to incorporate this issue through CTW's ongoing liaison with existing mines, NSW Department of Mineral Resources, constituent Councils and DECCW.	unknown	This option has no immediate impact on Council's TRB.
SS15-CTW	Grenfell relies on the pipeline from Gooloogong for its water supply and would be at risk if the pipeline failed.	There is currently 2 days peak storage available at Grenfell Reservoirs. CTW advises that Gooloogong pipeline replacement preliminary design process will commence in 2012 – 2013. Construction is expected to begin in 2013-14. Development of a detailed pipeline replacement plan is included in CTW's 2010 financial plan, SBP and capital works plan. The process is considered as asset replacement. There is no existing risk assessment.	<ul style="list-style-type: none"> ▪ \$174K in 2012/13 ▪ \$3,015K in 2013/14 ▪ \$3,015K in 2014/15 (NPV = 4,592K)	TRB = \$26
SS16-CTW	Bimbi and Caragabal are not connected to reticulated water	CTW Management Plan looks into the possibility to provide water supply to Caragabal. This will be from the bore supply in Quandialla across to Caragabal. Caragabal is supplied through a committee managed private non-potable supply. CTW to perform feasibility study and implement proposed actions in the feasibility study developed to address issues identified in the IWCM Studies.	(included in SS9-CTW)	N/A

3.3 Outcomes

The table below detailed the actions to be implemented in the CTW preferred scenario and the monitoring process required to be undertaken to address the remaining IWCM issues for CTW.

Table 10: CTW Preferred Scenario

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
4	Central Tablelands Future Water Security	Low level demand management Demand Management Package 1 which includes: <ul style="list-style-type: none"> ▪ National Mandatory Water Efficiency Labelling Scheme (WELS), ▪ Community Education, ▪ Permanent Low Level Restrictions on Water Use (Water Conservation Measures), ▪ BASIX – Fixture Efficiency with Rainwater Use. Surface Water Option to construct a river off take at Blayney Blue Hole and connect new pipelines to Blayney Water Filtration Plant	\$4	DM Package 1 (2013) Surface Water Option (2018)
SS8-CTW	Some Levels of Service targets from the CTW Management Plan 2007 were not met. <ul style="list-style-type: none"> ▪ Maximum frequency of unplanned consumer disruptions ▪ Compliance with 2004 ADWG – total coliforms and thermo-tolerant coliforms 	Modify CTW Strategic Business Plan level of service targets and implement revised actions.	No cost	When SBP is next updated (2015)
SS9-CTW	In 2005/06 CTW's performance was below the NSW median for: % population without reticulated water Water quality compliant	Prepare a water supply strategy study including water supply to the five villages (Newbridge, Barry, Neville, Caragabal, and Bimbi) and Implement proposed actions in study developed to address issues identified in the IWCM Studies.	\$0.20	Before 2021

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
SS11-CTW	Macro water plans for unregulated rivers in the region will establish water sharing rules between competing users including the environment.	Evaluate the impact of the relevant water sharing plans to be completed shortly.	No cost	After the relevant Water Sharing Plans are completed (anticipated in 2011) (Note: NSW Office of Water identified Water sharing plans and water security issues are mostly factors beyond the control of the water utility, they should therefore not be listed as a major issue)
SS13-CTW	Groundwater security.	Liaise with NSW Office of Water to develop a formalized long term groundwater security agreement that, based on groundwater yield study specifically provides for CTW to have urban water priority access to groundwater for the next 30 years.	No cost	Before 2021
SS14-CTW	Future non-urban demand particularly from gold mining in Blayney Shire.	Council to incorporate future non-urban demand (including gold mining in Blayney Shire) in the next IWCM.	No cost	2017
SS15-CTW	Grenfell relies on the pipeline from Gooloogong for its water supply and would be at risk if the pipeline failed.	Replace Gooloogong pipelines	\$26	2013-14
SS16-CTW	Bimbi and Caragabal are not connected to reticulated water	(included in SS9-CTW)	No cost	Before 2021
Total TRB Increment (\$/year per property):			\$30.20	

3.4 Action Implementation

Some of CTW's IWCM Evaluation Study issues are resolved with BaUS actions. Many of these actions rely on the provision of adequate financial and human resources. Details of these actions were included in the Joint IWCM Evaluation Study completed in Feb 2009.

CTW's IWCM remaining issues will be addressed by the recommended preferred scenario (Table 10). The implementation timeframe for each action has been nominated by Council. The IWCM preferred scenario actions are to be implemented within the next 30 years. Details of these actions are included in Table 10.

The preferred scenario would have a combined impact of \$30.20 increment on Council's typical residential bill (water) per year.

3.5 Monitoring

To ensure the IWCM issues are successfully addressed, remediation or changes of each IWCM issue are to be updated and documented by Council before the next IWCM cycle.

Annual reviews are recommended for Council as a general monitoring process. Council may also take advantage of the NSW Office of Water's TBL Performance Report to provide general information in the form of an annual monitoring process.

The next IWCM cycle will confirm if the IWCM recommended actions have effectively addressed CTW's identified issues.

3.6 Recommendations

The PRG recommended CTW to implement the preferred scenario described in Table 10 according to the Action Implementation Plan in Section 3.4.

4 Weddin Shire Council

4.1 Scenario Analysis

The key issues that triggered a detailed strategy for Weddin Shire Council were Greenethorpe and Quandialla not being seweraged. The existing septic systems in both villages are subject to unfavourable percolation conditions and inadequate dwelling effluent drainage areas (particularly during wet weather). These conditions may lead to groundwater contamination and may cause potential health risks to the villages and the surrounding area.

Grenfell STP's gravity system has a capacity of 2,500 EP and it is servicing a population of 1800 currently. Although Grenfell STP may have sufficient capacity to handle additional loads from Greenethorpe (60 EP) and Quandialla (179 EP) (source: 2006 census data), the PRG Workshop 2 considered that the options to maintain existing septic systems and to pump sewage to the existing Grenfell STP were not technically feasible.

At the request of the PRG, HydroScience did a preliminary review on potential alternative technologies to conventional treatment. These technologies included:

- ❑ worm farm septic systems,
- ❑ composting toilets,
- ❑ aerated on-site sewage management system for single households (Option 6D & 7D),
- ❑ common effluent drainage systems (CED) (Option 6E & 7E).

Worm farming and composting toilets options would not resolve the effluent drainage issues in both Greenethorpe and Quandialla. These options only deal with the solid waste. They were therefore not considered as technically feasible options to address WSC's IWCM issues.

An aerated on-site sewage management system to replace the existing septic system for single households in Greenethorpe and Quandialla was considered. Details of this option are included in Appendix G.

This option was presented to the PRG Workshop 3. However after discussion, the PRG recommended that a common effluent drain (CED) option be developed for each village and that Weddin Council officers consider if the option should be included in the preferred scenario.

CED Option

CED is a system in which septic tank effluent is collected in a gravity reticulation network. The lack of settleable solids (they are retained in the septic tanks) allows

smaller diameter sewers. CED is considered attractive from a cost perspective however very few have been built in NSW as there are a number of less favourable aspects typically associated with the septic systems. However, CED provides an option which resolves the existing unfavourable percolation conditions and inadequate dwelling effluent drainage areas concerns of the existing septic system. CED scenarios were developed after the PRG Workshop 3 with evaluation provide by Weddin Shire Council staff. Details of these options are included in Appendix G.

4.1.1 WSC Scenario Evaluation

Three technically feasible scenarios were developed to address the IWCM issues in Weddin Shire Council.

WSC Scenario 1 - Local STP

WSC Scenario 1 was based on building local sewage treatment plants (STP) at both Greenethorpe and Quandialla. An assumption was made that the NSW Office of Water would provide financial assistance of up to 50 per cent of the local STPs capital cost project (see Table 11). (Source: NSW Office of Water, Country Towns Program's financial assistance)

Table 11: WSC Scenario 1 Option Components

WSC Scenario 1		Local STP							
Option Components		E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
6B	Build Greenethorpe local STP	4	3	3	4	4	0.80	9.2	1
7B	Build Quandialla local STP	4	3	3	4	4	1.91	3.8	2

WSC Scenario 2 - Aerated On-Site Sewage Management System for Single Households

WSC Scenario 2 was developed on the basis of replacing the existing septic systems with an aerated on-site sewage management system for each household in Greenethorpe and Quandialla. The costs of this scenario would fall upon the local residents directly (see Table 12).

Table 12: WSC Scenario 2 Option Components

WSC Scenario 2		Aerated on-site sewage management system for single households							
Option Components		E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
6D	Aerated on-site sewage management system for single households in Greenethorpe	1	2	2	1	1	0.98	2.7	3
7D	Aerated on-site sewage management system for single households in Quandialla	1	2	2	1	1	1.95	1.4	4

WSC Scenario 3 – CEDS & local STPs

After the PRG Workshop 3, Weddin Shire Council staff evaluated the TBL rating. Council Staff requested the TBL Environmental Criteria E1: river sustainability/water quality be modified to E1: river sustainability/water quality (environmental impact), in order to reflect the environmental impact of this scenario.

WSC Scenario 3 was developed on the basis of constructing a Common Effluent Drain (CED) System with addition of a new local STP. The existing septic tanks would be retained and expected to remove approximately 50% of the solids and to reduce the loads on the new local STP. As a result the local STP required would be slightly smaller than those recommended in Scenario 1.

An assumption was made that the NSW Office of Water would provide financial assistance of up to 50 per cent of the local STPs capital cost project (see Table 13). (Source: NSW Office of Water, Country Towns Program’s financial assistance)

Table 13: WSC Scenario 1 Option Components

WSC Scenario 3		CEDS & local STPs							
Option Components		E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
6E	Greenethorpe CEDS & local STP	3	3	4	3	3	0.65	9.8	1
7E	Quandialla CEDS & local STP	3	3	4	3	3	1.67	3.8	2

4.1.2 WSC Scenario Comparison

The scenario impact on the Typical Residential Bill (TRB) to be shared across all WSC’s sewerage customers was evaluated. These potential TRB increments were estimated on the basis of existing TRB at \$225 per property per annum in WSC in 2008/09 (source: NSW Office of Water TBL Water Supply Performance Report 08/09). A population growth rate of 0.5% is assumed in these calculations.

Details of the TBL criteria rating for each scenario are included in Table 14. Scenario 3 has the highest scenario TBL ranking and the lowest TRB increment.

Table 14: WSC Scenarios Summary

WSC Scenarios	Included Options	Scenario Criteria			Scenario		Increase in TRB (per year)
		Environmental (average)	Social (average)	NPV (\$M)	TBL	Ranking	
Scenario 1	6B 7B Local STP	3.3	4.0	2.71	2.71	2	\$76
Scenario 2	6D 7D Aerated on-site sewage management system for single households	1.7	1.0	2.93	0.91	3	\$82
Scenario 3	6E 7E CEDS & local STPs	3.33	3.00	2.32	2.73	1	\$65

The scenario TRB impacts shown in Table 14 were calculated under the assumption that the increments would be shared across all the sewerage services customers in Weddin Shire. However, if the capital cost was to be shared among approximately 40 and 80 potential local sewerage service connections in Greenethorpe and Quandialla respectively, Scenario 1 would have an impact of \$753 per property per annum; Scenario 2 would have an impact of \$814 per property per annum; Scenario 3 would have an impact of \$644 per property per annum.

4.1.3 Selected scenario

The PRG decided to get CEDs Scenario developed and delegate the preferred scenario decision to Councils staff. Council staff chose Scenario 3 as the selected scenario to address WSC's sewerage issues at Greenethorpe and Quandialla.

4.1.4 WSC IWCM Single Solutions

During the PRG Workshop 2, the following options were evaluated and accepted to address CTW's IWCM issues which do not require significant capital works within 10 years.

Table 15: WSC Single Solutions

Option No.	WSC IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS17-WSC	<p>Level of service targets not met in 2004:</p> <ul style="list-style-type: none"> ▪ Category one system failures due to rainfall and deficient capacity ▪ Category three system failures due to blockages ▪ Response times to priority one incidents during working hours and to general or minor customer complaints and inquiries 	<p>Last Weddin SBP was in 2004. SBP is to be updated shortly. Council is recommended to review LOS in the new SBP to better reflect the ability to meet service targets and to identify the need for minor capital works.</p> <p>Note: WSC SBP will be developed as part of the Strategic Business Plans for Water Supply and Sewerage Services for Central NSW Councils. The tender for this project closed in late 2012 and the final phase is scheduled to commence in 2013/14.</p>	<p>PRG recommended at the workshop to update SBP at \$15K.</p> <p>(If LOS cannot be reduced, Council may need to consider approximately \$1M of extra capital works. This is only a draft estimate.)</p>	<p>TRB = \$4.23</p> <p>(If LOS cannot be reduced, Council may need to consider approximately \$28 extra on TRB)</p>
SS18-WSC	<p>Bimbi and Caragabal are not connected to sewerage service.</p>	<p>WSC intends to do feasibility studies on these villages to examine the best options in the next 10 to 15 years. Implement the proposed actions in the feasibility studies to address issues identified in the IWCM Studies. Council expects these may include septic tank upgrades, on site treatment or local small STP development.</p>	<p>Cost of feasibility studies for WSC is approximately NPV = \$30k</p>	<p>TRB = \$0.90</p>

Option No.	WSC IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS19-WSC	Council estimates that Grenfell STP upgrade will be necessary in 2020 but this is based on condition of assets and changes in DECCW requirements in the future.	Condition of the assets assessment will drive this. A number of OH&S upgrades have been identified as have major maintenance works including the need to replace trickling filter components in the near future. Council is considering implementing an investigation study; examine the options to extend the plant lifespan for another 10 years out to 2030.	Cost of investigation study : \$60K (Alternatively, estimated cost of a new STP: approximately \$7 million plus drainage and pipes costs \$100K per year, NPV = \$6,859K)	TRB = \$1.70 (estimated cost of a new STP will need extra TRB of \$193)
SS20-WSC	There is no Asset Management Plan or Emergency Plan for the Grenfell STP.	It is recommended that WSC prepare an Asset Management Plan and Emergency Plan for the Grenfell STP within the next 3 years. Implement proposed actions in plans developed to address issues identified in the IWCM Studies.	In house or external costs on Asset Management Plan and Emergency Plan at approximately \$20K	TRB = \$0.60
SS21-WSC	Meeting reuse guidelines now and in the future at Grenfell.	To satisfy NSW regulations for the reuse scheme, Council needs to apply to NSW Office of Water for a Section 60 and possibly perform of Review of Environmental Factors depending on the use i.e. low, Medium or high risk exposure level disinfection using UV and/or chlorination may be required.	Cost of UV/ chlorine disinfection system and installation plus investigation study including Section 60 application and approval process (\$10-20K). Approximately \$60K total.	TRB = \$1.70
SS22-WSC	The Capital Works Plan for sewerage and drainage services does not match the 2004 Strategic Business Plan.	Council will be updating the Capital Works Plan as part of the new SBP which is to be updated every 3 years. (refer to SS18-WSC)	(included in SS17-WSC)	(included in SS17-WSC)

4.2 Outcomes

The table below detailed the actions to be implemented and the monitoring process required to be undertaken to address the remaining IWCM issues for Weddin Shire Council.

Table 16: WSC Preferred Scenario

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
6	Greenethorpe is not sewered	Construction of CEDs & Local STP at Greenethorpe and at Quandialla	\$65	Before 2020
7	Quandialla is not sewered			
SS17-WSC	Level of service targets not met in 2004: <ul style="list-style-type: none"> ▪ Category one system failures due to rainfall and deficient capacity, ▪ Category three system failures due to blockages, ▪ Response times to priority one incidents during working hours and to general or minor customer complaints and inquiries. 	Review WSC SBP level of service targets	\$4.23	When the next SBP is updated (2012)
SS18-WSC	Bimbi and Caragabal are not connected to sewerage service.	Prepare Feasibility Studies on sewerage service for Bimbi and Caragabal and implement the proposed actions in the plan to address issues identified in the IWCM Studies.	\$0.90	Before 2026
SS19-WSC	Council estimates that Grenfell STP upgrade will be necessary in 2020 but this is based on condition of assets and changes in DECCW requirements in the future.	Prepare an Investigation Study to extend the Grenfell STP lifespan	\$1.70	Before 2030

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
SS20-WSC	There is no Asset Management Plan or Emergency Plan for the Grenfell STP.	Prepare an Asset Management Plan and an Emergency Plan for the Grenfell STP. Implement proposed actions in plans developed to address issues identified in the IWCM Studies.	\$0.60	Before 2014
SS21-WSC	Meeting reuse guidelines now and in the future at Grenfell.	Prepare Section 60 application & approval for effluent reuse and install a UV/ chlorine disinfection system at the Grenfell STP	\$1.70	2012
SS22-WSC	The Capital Works Plan for sewerage and drainage services does not match the 2004 Strategic Business Plan.	Update WSC Capital Works Plan as part of SBP (included in SS17-WSC)	No cost	(included in SS17-WSC)
Total TRB Increment (\$/year per property):			\$74.13	

4.3 Action Implementation

Some of WSC's IWCM Evaluation Study issues were resolved with BaUS actions. Many of these actions rely on the provision of adequate financial and human resources. Details of these actions were included in the Joint IWCM Evaluation Study completed in Feb 2009.

WSC's IWCM remaining issues will be addressed by the recommended preferred scenario (Table 16). The implementation timeframe for each action has been nominated by Council. The IWCM preferred scenario actions are to be implemented within the next 30 years. Details of these actions are included in Table 16.

The preferred scenario would have a combined impact of \$74.13 increment on Council's typical residential bill (sewerage) per year.

4.4 Monitoring

To ensure the IWCM issues are successfully addressed, remediation or changes of each IWCM issue are to be updated and documented by Council before the next IWCM cycle.

Annual reviews are recommended for Council as a general monitoring process. Council may also take advantage of the NSW Office of Water's TBL Performance Report to provide general information in the form of an annual monitoring process. However NSW Office of Water has advised that when using information reported in the Best-Practice performance reports, accuracy should be checked and only data supported by evidence on the ground should be used.

The next IWCM cycle will confirm if the IWCM recommended actions have effectively addressed WSC's identified issues.

4.5 Recommendations

The PRG recommended WSC to implement the preferred scenario described in Table 16 according to the Action Implementation Plan in Section 4.3.

5 Blayney Shire Council

5.1 Scenario Analysis

Blayney Shire Council (BSC) has a number of issues that triggered a detailed strategy. These IWCM issues were based on Lyndhurst, Mandurama and Carcoar not being seweraged. The existing septic systems in these villages are subject to unfavourable ground percolation conditions and inadequate dwelling effluent drainage area (particularly during wet weather). These conditions may lead to groundwater contamination and may cause potential health risks to the villages and the surrounding area.

At PRG Workshop 2, the PRG decided that the option of building a local sewage treatment plant (STP) at Carcoar (with no reuse) was not technically feasible. Also the PRG did not consider reuse at these towns as being a financially feasible option for replacing CTW potable supply. As a result, the solutions to seweraging Lyndhurst, Mandurama and Carcoar are limited to the following two options:

- ❑ 1E – Build Lyndhurst STP to receive additional sewage from Mandurama & Carcoar with no reuse,
- ❑ 1F - Pump sewage from Lyndhurst, Mandurama & Carcoar to Blayney STP.

BSC scenarios were developed based on applying these options.

5.1.1 BSC Scenario Evaluation

BSC Scenario 1 - Build Lyndhurst STP to Receive Additional Sewage from Mandurama & Carcoar

BSC Scenario 1 was based on building a local sewage treatment plant at Lyndhurst. This sewage treatment plant would also receive sewage from Mandurama and Carcoar. No effluent reuse was included in this scenario (see Table 17). Note: The estimated capital costs for the sewerage treatment plant options were based on total available dwellings of 152, 95 and 112 at Lyndhurst, Mandurama and Carcoar respectively (source: 2006 Census data).

Table 17: BSC Scenario 1 Option Component

BSC Scenarios 1									
Option Components		E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
1E	Build Lyndhurst STP to receive additional sewage from Mandurama & Carcoar with no reuse	4	1	3	4	4	8.69	0.8	1

BSC Scenario 2 - Pump Sewage from Lyndhurst, Mandurama & Carcoar to Blayney STP

BSC Scenario 2 was based on transferring sewage from Lyndhurst, Mandurama and Carcoar to the existing Blayney Sewage Treatment Plant (see Table 18).

Table 18: BSC Scenario 2 Option Component

BSC Scenarios 2									
Option Components		E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
1F	Pump sewage from Lyndhurst, Mandurama & Carcoar to Blayney STP	4	4	1	3	4	9.46	0.7	2

5.1.2 BSC Scenario Comparison

The scenario impact on the Typical Residential Bill (TRB) to be shared across all BSC's sewerage customers was evaluated. These potential TRB increments were estimated on the basis of existing TRB at \$430 per property per annum in BSC in 2008/09 (source: NSW Office of Water TBL Water Supply Performance Report 08/09). A population growth rate of 0.6% is assumed in these calculations. This population growth rate was previously evaluated in the Joint IWCM Evaluation Study.

The NSW State Government's Country Towns Water Supply and Sewerage Program provide financial assistance to local water utilities towards the capital cost of the backlog component of approved water supply and sewerage infrastructure. The subsidy includes 50 per cent of the backlog component capital cost if an unsewered town is listed in the small town sewerage program. However, this subsidy was not assumed in BSC's scenario evaluation.

Details of the TBL criteria rating for each scenario are included in Table 19. Scenario 1 has a higher scenario TBL ranking and a lower TRB increment compared to Scenario 2.

Table 19: BSC Scenarios Summary

BSC Scenarios	Included Options	Scenario Criteria			Scenario		Increase in TRB (per year)
		Environmental (average)	Social (average)	NPV (\$M)	TBL	Ranking	
Scenario 1	1E Build Lyndhurst STP to receive additional sewage from Mandurama & Carcoar with no reuse	2.7	4.0	8.69	0.8	1	\$68
Scenario 2	1F Pump sewage from Lyndhurst, Mandurama & Carcoar to Blayney STP	3.0	3.5	9.46	0.7	2	\$74

The scenario TRB impacts in Table 19 were calculated under the assumption that the increments would be shared across all the sewerage customers in Blayney Shire including future additional connections in Lyndhurst, Mandurama and Carcoar.

5.1.3 Selected scenario

The PRG agreed and accepted Scenario 1 as the selected scenario to address BSC's issues of Lyndhurst, Mandurama and Carcoar not being seweraged.

BSC Scenario 1 is based on building a sewage treatment plant at Lyndhurst to receive additional sewage from Mandurama & Carcoar. Effluent reuse option at Lyndhurst STP is not included in this scenario.

5.1.4 BSC IWCM Single Solutions

During the PRG Workshop 2, the following options were evaluated and accepted to address BSC's IWCM issues which do not require significant capital works within 10 years.

Table 20: BSC Single Solutions

Option No.	BSC IWCM Issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS2-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> Pump power 	Council advised that there is no alternative power supply currently in place. Emergency power backup systems are being developed and this will require agreement with the power supplier or emergency generators. Council will need to negotiate with the power supply authority.	NPV = \$50K	TRB = \$0.40
SS3-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> Blockages and collapses 	Minor works are required to overcome blockages and collapses combined with long term replacement of asbestos cement pipes. Council is developing further investigation study to determine the options of using a CCTV facility.	<p>BSC's SBP capital works plan stated that:</p> <ul style="list-style-type: none"> CCTV inspections (which may also identify sources of excessive inflow e.g. wet weather inflow or illegal connections) will cost \$40K for 2 years Lining/replacement of sewer main expected to cost \$50K per year. <p>(NPV = \$277K)</p> <p>BSC has advised that Council is currently undertaking programmed CCTV and Smoke Testing to identify potential illegal connection (source: email communication with BSC staff, May 2013)</p>	TRB = \$2.20

Option No.	BSC IWCM Issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS4-BSC	<p>Level of service targets were not met in 2007/08 for:</p> <ul style="list-style-type: none"> Response times for system failures after working hours 	<p>Council advised that currently there are 2 staff members responsible for handling system failures after working hours and the response time is 60 min. Council will need to review LOS in SBP to match this.</p>	\$0	This option has no impact on Council's TRB.
SS5-BSC	<p>Areas where DECCW Best Practice Management Guidelines are not met (LOS):</p> <ul style="list-style-type: none"> Development Servicing plan (DSP) – not completed 	<p>Council's Development Servicing Plan is to be prepared as part of the CENTROC Water Utilities Alliance 2011/12 Program as part of a regional project.</p> <p>Council's Liquid trade Waste Policy (LTWP) will be completed by end of 2010/11 financial year.</p>	<p>Estimated cost for DSP is \$5,000 (this amount is BSC's estimated portion from the regional project's collective cost)</p> <p>Estimated cost for LTWP is \$0</p> <p>BSC advised in June 2013 that the DSPs for Blayney and Millthorpe are in place and operational.</p> <p>A proposed review of the DSPs will be undertaken as part of Centroc Water Utilities Alliance program in 2013/14</p>	TRB = \$0.04
SS6-BSC	Wet weather inflow and illegal connections at Blayney STP	<p>Council needs to investigate and identify sources of excessive inflow exceeding the pump station's capacity. An investigation study is required.</p>	(included in SS3-BSC)	(included in SS3-BSC)

5.2 Outcomes

The table below detailed the actions to be implemented and the monitoring process required to be undertaken to address the remaining IWCM issues for Blayney Shire Council.

Table 21: BSC Preferred Scenarios

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
1	Unsewered villages: Lyndhurst is not sewered	Build Lyndhurst STP to receive additional sewage from Mandurama & Carcoar with no reuse	\$68	Before 2021
2	Unsewered villages: Mandurama is not sewered			
3	Unsewered villages: Carcoar is not sewered			
SS2-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> Pump power 	Develop sewerage service emergency power backup systems.	\$0.40	Before 2021
SS3-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> Blockages and collapses 	Prepare an investigation study on sewerage pipes replacement	\$2.20	Before 2021
SS4-BSC	Level of service targets were not met in 2007/08 for: <ul style="list-style-type: none"> Response times for system failures after working hours 	Review sewerage service SBP level of service targets	No cost	When the next SBP is updated

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
SS5-BSC	Areas where DECCW Best Practice Management Guidelines are not met (LOS): <ul style="list-style-type: none"> ▪ Development Servicing plan (DSP) – not completed 	Prepare Development Servicing Plan	\$0.04	Before 2021
SS6-BSC	Wet weather inflow and illegal connections at Blayney STP	(Included in SS3-BSC)	No cost	(Included in SS3-BSC)
Total TRB Increment (\$/year property):			\$70.64	

5.3 Action Implementation

Some of BSC's IWCM Evaluation Study issues are resolved with BaUS actions. Many of these actions rely on the provision of adequate financial and human resources. Details of these actions were included in the Joint IWCM Evaluation Study completed in Feb 2009.

BSC's IWCM remaining issues will be addressed by the recommended preferred scenario (Table 21). The implementation timeframe for each action has been nominated by Council. The IWCM preferred scenario actions are to be implemented within the next 30 years. Details of these actions are included in Table 21.

The preferred scenario would have a combined impact of \$70.64 increment on Council's typical residential bill (sewerage) per year.

5.4 Monitoring

To ensure the IWCM issues are successfully addressed, remediation or changes of each IWCM issue are to be updated and documented by Council before the next IWCM cycle.

Annual reviews are recommended for Council as a general monitoring process. Council may also take advantage of the NSW Office of Water's TBL Performance Report to provide general information in the form of an annual monitoring process.

The next IWCM cycle will confirm if the IWCM recommended actions have effectively addressed BSC's identified issues.

5.5 Recommendations

The PRG recommended BSC to implement the preferred scenario described in Table 21 according to the Action Implementation Plan in Section 5.3.

6 Cabonne Shire Council

Cabonne Shire Council (CSC) has a number of issues that triggered a detailed strategy. A key issue was the water security in Molong Water Supply System.

6.1 Molong Creek Dam & Borenore Creek Dam Safe Yield Analysis

Molong Creek Dam is the major water source for Molong town in Cabonne Shire.

SMEC estimated the safe yield of the Molong water supply system to be 230 megalitres per annum under the following assumptions.

- ❑ rainfall reduction by up to ten per cent in 2030 in SE Australia (CSIRO estimation), leading to a fifteen to a twenty five per cent reduction in inflows (SMEC's hydrological studies).

However, this estimation was not fully compliant with the 5/10/20 rule.

The Review of Safe Yield for Molong Creek Dam & Borenore Creek Dam is included in Appendix C.

6.2 CSC Scenario Analysis

Based on the CSC baseline demand projection and SMEC's safe yield analysis of Molong Creek Dam & Borenore Creek Dam, Molong water demand would be expected to exceed water supply in mid-2022 (see Figure 5).

Molong Water Demand Projections and Molong Creek Dam & Borenore Creek Dam Safe Yield

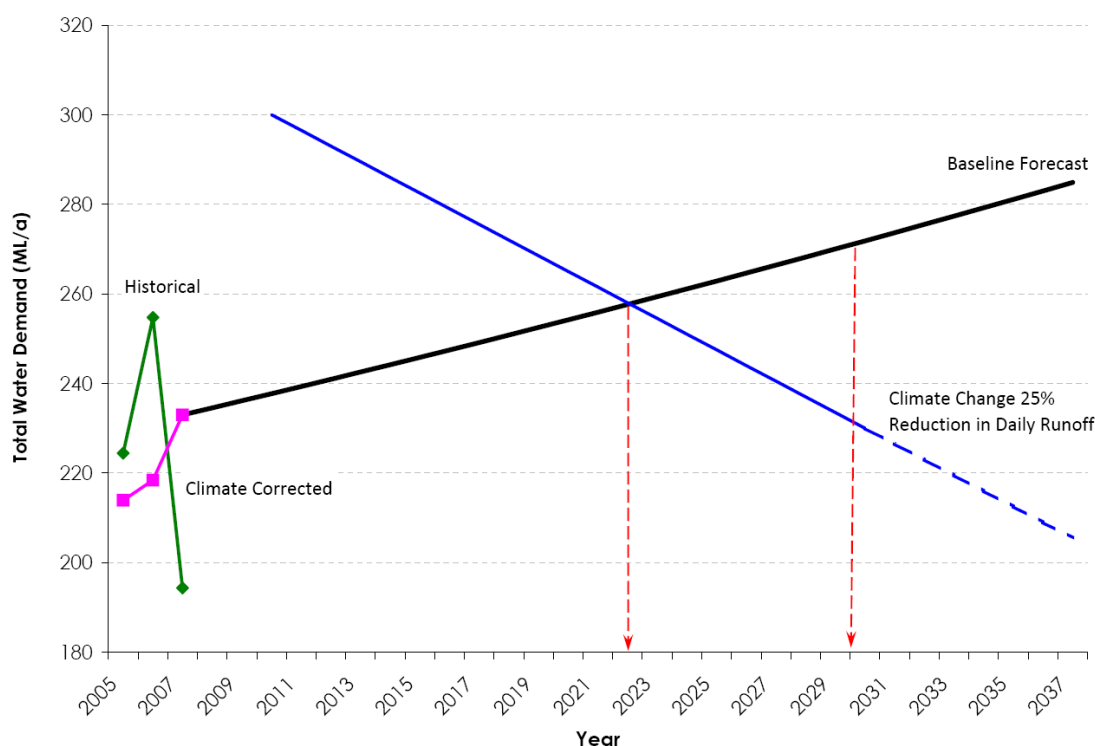


Figure 5: Molong Water Demand Projections and Molong Creek Dam & Borenore Creek Dam Safe Yield

By 2030, a minimum of 42 megalitre per annum extra water supply would be required. A summary of this projection is included in Table 22 below.

Table 22: Molong Future Demand & Supply Projections

Future Water Demand Estimated Projections	2030 Projected values (ML/year)
Molong water supply’s climate corrected annual demand baseline forecast (Source: Joint IWCM Evaluation Study – Demand Projection, HydroScience, Feb 2009)	272
Safe yield of Molong water supply system (based on 25% inflows reduction due to climate change (Source: Review of Safe Yield for Molong Creek Dam and Borenore Creek Dam, HydroScience/SMEC, Sept 2010)	230
Estimated minimum extra water supply requirement in 2030	42

The scenario development process incorporated factors such as the minimum additional water supply required to overcome the potential water shortage in CSC, option TBL ranking and impact on TRB from each scenario.

The purpose of scenario development is to perform analysis on combinations of themed options. Scenario ranking provides an indication of the relative merit of a selected scenario based on TBL criteria. The higher the TBL value the more favourable the scenario is considered.

Four scenarios were developed to address CSC's IWCM issues. These scenarios are detailed in the following sections and summarised in Table 27.

6.2.1 CSC Scenario Evaluation

Base Case

CSC Base Case was based on a "Do Nothing" situation i.e. if Cabonne Shire Council takes minimal to no additional action to secure the minimum estimated future demand of 42 megalitres per annum by 2030. In the event that water demand would exceed supply, one of the least favourable alternatives (of water carting from Manildra) would be considered as a base case remediation.

An estimation of the water carting cost was made on basis with the following assumptions:

- ❑ Water carting cost is approximately \$0.56 per km per kilolitre,
- ❑ Central Tablelands Water would supply water at \$1.70 per kilolitre.

With the approximate distance of 34.2 km between Molong and Manildra, the estimated cost is \$872,000 per annum.

This base case would make available 42 megalitres per annum which would overcome the water shortage. However this action has unfavorable environmental and economic aspects of low in energy efficiency and excessively high cost. As a result, the "Do Nothing" was not considered as a viable alternative to address this IWCM issue.

CSC Scenario 1 - Low Level Demand Management & Thistle Street Well & Surface Water Supplies

CSC Scenario 1 was developed on the basis of 8C: obtaining ground water from Thistle Street Well; 8H: applying low level demand management and 8B: the utilization of licensed Molong Creek surface water resources near Hunter Caldwell Park & Molong Recreation Ground.

Low level demand management includes water efficiency labelling scheme, community education, BASIX, system water loss management and permanent low level water restrictions. The options to use Thistle Street well & surface water supplies involve water extraction from the Thistle Street Well for irrigation and the utilization of licensed Molong Creek surface water resources near Hunter Caldwell Park and Molong Recreation. This scenario had a high scenario TBL ranking and low TRB increment (see Table 23).

Table 23: CSC Scenario 1 Option Components

CSC Scenario 1		Low level demand management + Thistle Street Well + surface water supplies								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
8C	Thistle Street Well	4	5	4	2	3	3	0.01	666.7	1
8H	DM Option Package 2 - water efficiency labelling scheme, community education, BASIX, system water loss management, permanent low level water restrictions	17	5	4	4	5	2	0.10	75.0	3
8B	Utilisation of licensed Molong Creek surface water resources near Hunter Caldwell Park & Molong Recreation Ground	22	2	4	3	3	3	0.11	53.5	5

CSC Scenario 2 - High Level Demand Management & Thistle Street Well & Surface Water Supplies

CSC Scenario 2 was developed on the basis of getting ground water from Thistle Street Well; 8J: applying high level demand management and 8B: the utilization of licensed Molong Creek surface water resources near Hunter Caldwell Park & Molong Recreation Ground.

High level demand management includes water efficiency labelling scheme, community education, BASIX, system water loss management, permanent low level water restrictions, conservation pricing, shower retrofit, washing machine rebates, water audits and fixture code. The options to use Thistle Street well & surface water supplies involve water extraction from the Thistle Street Well for irrigation and the utilization of licensed Molong Creek surface water resources near Hunter Caldwell Park and Molong Recreation. This scenario had a high scenario TBL ranking and low TRB increment (see Table 24).

Table 24: CSC Scenario 2 Option Components

CSC Scenario 2		High level demand management + Thistle Street Well + surface water supplies								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
8C	Thistle Street Well	4	5	4	2	3	3	0.01	666.7	1
8J	DM Option Package 4 - water efficiency labelling scheme, community education, BASIX, system water loss management, permanent low level water restrictions, conservation pricing, shower retrofit, washing machine rebates, water audits, fixture code	27	5	5	5	5	1	0.16	50.5	6
8B	Utilisation of licensed Molong Creek surface water resources near Hunter Caldwell Park & Molong Recreation Ground	22	2	4	3	3	3	0.11	53.5	5

CSC Scenario 3 – Effluent Reuse

CSC Scenario 3 was developed on the basis of effluent reuse from Molong STP. The treated effluent would be considered for potable replacement purpose in option 8E and for new rural developments reticulated recycled water usage in option 8D. This scenario’s TBL ranking and TRB increment are included in Table 25 below.

Note: An assumption was made that 150 lots in the proposed rural residential development (referred to in Option 8D) were included in the CSC’s Demand Modelling Projection curve (Figure 5).

Table 25: CSC Scenario 3 Option Components

CSC Scenario 3		Effluent reuse								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
8E	Effluent reuse – Industrial, Parks & STP	10	4	5	3	3	4	0.56	13.4	8
8D	Effluent reuse – Rural & STP (new rural development with third pipe)	60	4	5	3	3	4	0.77	9.7	9

CSC Scenario 4 – Molong Creek Dam Augmentation

CSC Scenario 4 was developed on the basis of raising Molong Creek Dam which would generate an additional supply of approximately 150 ML/year to supplement the existing water resources. This scenario had a high TRB increment which may identify this as the least favourable scenario to address Molong's future water security issue (see Table 26).

Table 26: CSC Scenario 4 Option Components

CSC Scenario 4		Molong Creek Dam augmentation								
Option Components		Additional Supply ML/year	E1	E2	E3	S1	S2	NPV (\$M)	Option TBL	Option Ranking
8A	Raising Molong Creek Dam	150	2	4	3	5	3	4.67	1.5	10

6.2.2 CSC Scenario Comparison

The scenario impacts on CSC's water supply Typical Residential Bill (TRB) were evaluated. These potential TRB increments were estimated on the basis of existing TRB at \$366 per property per annum in CSC in 2008/09 (source: NSW Office of Water TBL Water Supply Performance Report 08/09). A population growth rate of 0.67% was assumed in these calculations.

The Typical Residential Bill (TRB) increment required for CSC to carry out each scenario was estimated in addition to Council's existing TRB charges. The TRB increment value is to be shared across the CSC's water supply customers.

Details of the TBL criteria rating for each scenario are included in Table 27. Scenario 1 has the highest scenario TBL ranking and the lowest TRB increment.

Table 27: CSC Scenarios Summary

CSC Scenarios	Description	Included Options	Estimated Additional Supply (ML/year)	Scenario Criteria			Scenario TBL	Scenario Ranking	Increase in TRB (per year)
				Environmental (average)	Social (average)	Economic - overall NPV (\$M)			
Scenario 1	Low level demand management + Thistle Street Well + surface water	8C Thistle Street Well	43	3.7	3.2	0.23	30.2	1	\$6
		8H DM Option Package 2							
		8B Utilisation of licensed Molong Creek surface water							
Scenario 2	High level demand management + Thistle Street Well + surface water	8C Thistle Street Well	53	3.9	3.0	0.28	24.6	2	\$7
		8J DM Option Package							
		8B Utilisation of licensed Molong Creek surface water							
Scenario 3	Effluent reuse	8E Effluent reuse – Industrial, Parks & STP	70	4.0	3.5	1.33	5.6	3	\$34
		8D Effluent reuse – Rural & STP (new rural development with third pipe)							
Scenario 4	Dam augmentation	8A Raising Molong Creek Dam	150	3.0	4.0	4.67	1.5	4	\$120

6.2.3 Selected scenario

The PRG agreed and accepted Scenario 1 as the selected scenario to address Cabonne Shire Council water security issue in Molong Water Supply System.

Scenario 1 combines the application of low level demand management package 2, utilisation of Thistle Street Well for irrigation of the Molong Recreation Ground with the utilisation of licensed Molong creek surface water resources at Hunter Caldwell Park and Molong Recreation Ground.

When water demand reaches supply, additional water resource is needed. Point A, B and C in Figure 6 indicated 3 projected occasions when this may occur.

Point A shows that water supply baseline demand forecast reaches the linear projected Safe Yield of Molong Water Supply System in 2013. The selected scenario was therefore developed to address this future water security issue.

Under the assumption when the “low level demand management” option is applied in 2013, water demand would reduce 16.9 ML by applying the Demand Management Package 2.

Demand Management Package 2 is comprised of the following water conservation measures. These measures definitions are sourced from the Demand Side Management Decision Support System (DSS) Manual (July 2006):

- National Mandatory Water Efficiency Labelling Scheme (WELS),
- Community Education,
- BASIX – Fixture Efficiency with Rainwater Use,
- System Water Loss Management,
- Permanent Low Level Restrictions on Water use (Water Conservation Measures).

The Demand Management Package 2 applicable to the entire CSC water supply area would extend Molong’s water supply capacity to 2026 when it levels with the water demand at Point B.

The CSIRO climate change analysis was projected up to year 2030. For the purpose of illustration, the water supply projected values beyond 2030 were assumed to follow a similar linear trend.

When the selected scenario of “utilisation of Thistle Street Well for irrigation of the Molong Recreation Ground” and “utilisation of licensed Molong creek surface water resources at Hunter Caldwell Park and Molong Recreation Ground” are applied in 2024 and 2026, Molong water supply would increase by 4 ML and 22 ML respectively. These options would further extend Molong water supply capacity to 2032 at Point C.

Cabonne Council Preferred Scenario Implementation (for Molong Water Supply)

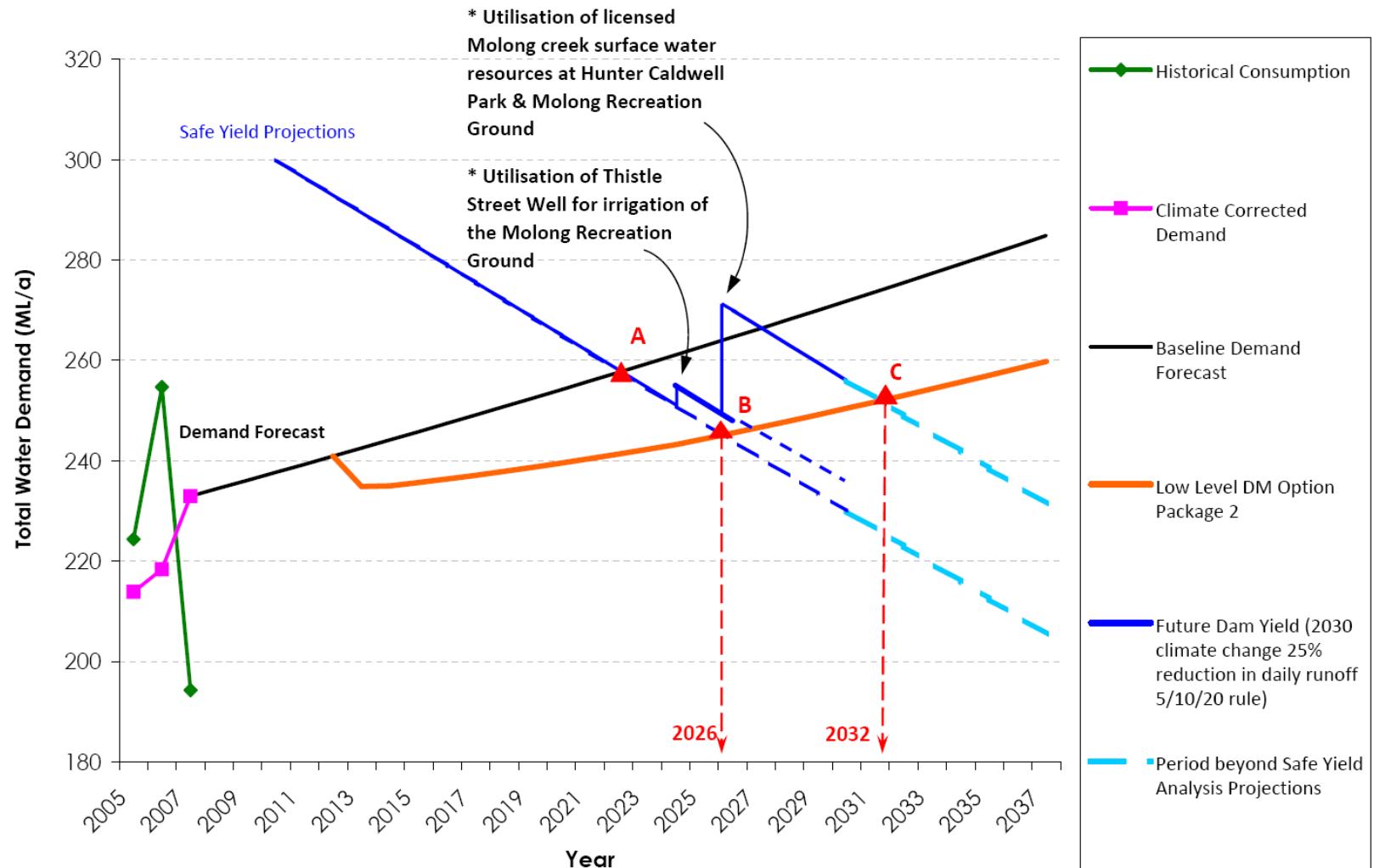


Figure 6: CSC Preferred Scenario Implementation

6.2.4 CSC IWCM Single Solutions

During the PRG Workshop 2, the following options were evaluated and accepted to address BSC's IWCM issues which do not require significant capital works within 10 years.

Table 28: CSC Single Solutions

Option No.	CSC IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS23-CSC	CSC's TBL performance in urban population without reticulated water had exceeded the NSW median value in 2005/06. In 2008/09 CSC's TBL performance on this has also exceeded the NSW median value.	<p>Two villages (Yeoval and Cumnock) have a non-potable water supply. This is under consideration as a longer term issue.</p> <p>CSC advised that Cumnock extracts water from a natural water hole in the river and there is an existing "turkey nest" off stream storage.</p> <p>A feasibility study on the development of a minor capital works plan and the implementation of proposed actions in the plan is recommended to address issues identified in the IWCM Studies.</p> <p>Note: the minor capital works plan will be based on the Centroc Water Security Study Strategy 2a to install new minor storages and water treatment facilities at both Cumnock and Yeoval</p>	Feasibility study cost - \$25K	TRB = \$0.60
SS24-CSC	CSC's TBL performance in number of water service complaints per 1000 properties had exceeded the NSW median value in 2005/06. In 2008/09, CSC's TBL performance on this has also exceeded the NSW median value.	<p>CSC recently installed a destratification/aeration system in Molong Dam and dose activated carbon in the Molong WTP. This has reduced iron, manganese and algal bloom issues.</p> <p>CSC has also included on going replacement of old water mains in Molong in the CSC capital works plan. This will need to be included as minor capital works.</p>	\$100K/year for 5 years (NPV = \$410K)	TRB = \$11

Option No.	CSC IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS27-CSC	<p>Canowindra STP has licence non-compliances from 2003/04 to 2005/06. Monitoring was not complete in 2007/08. There are also 3 incidents of non-compliance in 2009/10.</p> <p>Note: 2003/04 – exceeded pH and volumetric discharge limits</p> <p>2004/05 - exceeded pH, suspended solids and nitrogen limits</p> <p>2005/06 - exceeded pH, suspended solids, BOD and volumetric discharge limits</p>	<p>Council is in the process of replacing liquid chlorine with gaseous chlorine at the STP reuse disinfection system (source: communication with CSC staff, Nov 2010). Council has recently suggested in the licence non-compliance summary 2009/10 that major plant upgrade is planned for 2017/18. Council to perform investigation study to review modifications to improve plant performance and extend life. Implement proposed actions in the investigation study developed to address issues identified in the IWCM studies.</p>	<p>upgrade cost of \$350K in 2017/18 and augmentation at \$2.5 million in 2037/38 (NPV=\$580K)</p>	<p>TRB = \$15</p>
SS28-CSC	<p>Reconnection of Lake Canobolas as a water supply for Orange may impact on Molong Creek.</p>	<p>Develop a formal agreement (e.g. memorandum of understanding) between Orange City Council and CSC. The aim of this agreement, from CSC's perspective will be to ensure Molong Creek Dam Yield is unaffected by OCC's abstractions from Lake Canobolas.</p> <p>It is likely a technical and legal review of issues will be required.</p> <p>It should be noted that recently OCC has stopped making reference to using Lake Canobolas as a future water source (source: OCC meeting minutes, 20 Dec 2010; email communication with CSC staff, May 2013)</p> <p>However, CSC will still need to establish a formal agreement.</p>	<p>\$30K</p>	<p>TRB = \$0.80</p>

Option No.	CSC IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS29-CSC	Water security and water sharing: <ul style="list-style-type: none"> ▪ Land use change ▪ High intensity agriculture ▪ Mining developments and water demand ▪ Groundwater ▪ Water demand by neighbouring Orange 	Refer to Centroc Water Security Study. No action.	Estimated costs may be as indicated in Centroc report, preferred option F2A. However no actions have been taken to progress this at this point in time.	This option has no impact on Council's TRB. (Note: NSW Office of Water identified Water sharing plans and water security issues are mostly factors beyond the control of the water utility, they should therefore not be listed as a major issue)
SS30-CSC	Water security: <ul style="list-style-type: none"> ▪ The effect of growth in Orange on the catchment downstream ▪ The water demand of Cadia mine (Cadia has two dams, one will be enlarged if approval granted) 	Refer to Centroc Water Security Study. No action.	Estimated costs may be as indicated in Centroc report, preferred option F2A. However no actions have been taken to progress this at this point in time.	This option has no impact on Council's TRB.

Option No.	CSC IWCM issues	Option	Estimated Cost to Council (\$) & NPV (@7% over 30 years)	TRB Increment (\$ per property per annum)
SS31-CSC	Regular flooding of Molong impacting Molong pumping station.	<p>The Molong Flood Plain Management Plan is currently under review and this may identify stormwater improvements. Implement proposed actions in the plan developed to address issues identified in the IWCM Evaluation.</p> <p>Council advised that the Thistle Street sewage pumping station at Molong is within the 1:100 year flood envelope. However, the mound on which the electrical switchboard stands is some 400-500mm above the surrounding floodplain and less than 50 metres from the edge of the envelope. Council suggested that the entry to the pumping station well is above the 1:100 year flood level and therefore will not be affected during floods (source: communication with CSC staff. Nov 2010).</p>	Proceed to complete Molong Flood Plain Management Plan. No additional cost.	This option has no impact on Council's TRB.
SS32-CSC	<p>Growth in Orange will have an important influence on the Molong Creek Dam inflows region. Orange is addressing the severe water shortage in a number of ways. Two of these possible prospects include:</p> <ul style="list-style-type: none"> ▪ Stormwater harvesting (2000 ML/year) ▪ Reconnecting Lake Canobolas 	(see Issue SS28-CSC)		

6.3 Outcomes

The table below detailed the actions to be implemented and the monitoring process required to be undertaken to address the remaining IWCM issues for Cabonne Shire Council.

Table 29: CSC Preferred Scenarios

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
8	Water security in Molong Water Supply System	<p>Low level demand management Demand Management Package 2 which includes:</p> <ul style="list-style-type: none"> ▪ National Mandatory Water Efficiency Labelling Scheme (WELS), ▪ Community Education, ▪ BASIX – Fixture Efficiency with Rainwater Use, ▪ System Water Loss Management, ▪ Permanent Low Level Restrictions on Water use (Water Conservation Measures). <p>Utilisation of Thistle Street Well</p> <p>Utilisation of licensed Molong Creek surface water</p>	\$6	Before 2022
SS23-CSC	CSC’s TBL performance in urban population without reticulated water had exceeded the NSW median value in 2005/06. In 2008/09 CSC’s TBL performance on this has also exceeded the NSW median value.	Prepare a feasibility study to provide reticulated water supply to Cumnock and Yeoval and implement the proposed actions in the feasibility study to address issues identified in the IWCM Studies.	\$0.60	Feasibility study (2012)
SS24-CSC	CSC’s TBL performance in number of water service complaints per 1000 properties had exceeded the NSW median value in 2005/06. In 2008/09, CSC’s TBL performance on this has also exceeded the NSW median value.	Develop an on-going program to replace old water mains in Molong.	\$11	2011 over 5 years

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
SS27-CSC	Canowindra STP has licence non-compliances from 2003/04 to 2005/06. Monitoring was not complete in 2007/08. There are also 3 incidents of non-compliance in 2009/10.	Prepare an investigation study to review Canowindra STP performance and extend life. Implement proposed actions in the investigation study developed to address issues identified in the IWCM Studies.	\$15	Investigation study is expected to be completed before the planned STP upgrade in 2017/18
SS28-CSC	Reconnection of Lake Canobolas as a water supply for Orange may impact on Molong Creek.	Develop a formal agreement (e.g. memorandum of understanding) between Orange City Council and CSC. The aim of this agreement, from CSC's perspective will be to ensure Molong Creek Dam Yield is unaffected by OCC's abstractions from Lake Canobolas. It is likely a technical and legal review of issues will be required.	\$0.80	Before 2021
SS29-CSC	Water security and water sharing: <ul style="list-style-type: none"> ▪ Land use change ▪ High intensity agriculture ▪ Mining developments and water demand ▪ Groundwater ▪ Water demand by neighbouring Orange 	Refer to Centroc Water Security Study. No action.	No cost	N/A (Note: NSW Office of Water identified Water sharing plans and water security issues are mostly factors beyond the control of the water utility, they should therefore not be listed as a major issue)
SS30-CSC	Water security: <ul style="list-style-type: none"> ▪ The effect of growth in Orange on the catchment downstream ▪ The water demand of Cadia mine (Cadia has two dams, one will be enlarged if approval granted) 	Refer to Centroc Water Security Study. No action.	No cost	N/A

Issues		Actions To Be Implemented Or Monitoring To Be Undertaken	TRB Increment (\$/year per property)	Proposed Timeframe
SS31-CSC	Regular flooding of Molong impacting Molong pumping station.	Proceed to complete Molong Flood Plain Management Plan and implement proposed actions in the plan developed to address issues identified in the IWCM Studies.	No cost	Before 2021
SS32-CSC	Growth in Orange will have an important influence on the Molong Creek Dam inflows region. Orange is addressing the severe water shortage in a number of ways. Two of these possible prospects include: <ul style="list-style-type: none"> ▪ Stormwater harvesting (2000 ML/year) ▪ Reconnecting Lake Canobolas 	(included in SS28-CSC)		(included in SS28-CSC)
		Total TRB Increment (\$/year per property)	\$33.40	

6.4 Action Implementation

Some of CSC's IWCM Evaluation Study issues were resolved with BaUS actions. Many of these actions rely on the provision of adequate financial and human resources. Details of these actions were included in the Joint IWCM Evaluation Study completed in Feb 2009.

CSC's IWCM remaining issues will be addressed by the recommended preferred scenario (Table 29). The implementation timeframe for each action has been nominated by Council. The IWCM preferred scenario actions are to be implemented within the next 30 years. Details of these actions are included in Table 29.

The preferred scenario would have a combined impact of \$18.40 increment on Council's typical residential bill (water) and \$15.00 increment on Council's typical residential bill (sewerage) per year.

6.5 Monitoring

To ensure the IWCM issues are successfully addressed, remediation or changes of each IWCM issue are to be updated and documented by Council before the next IWCM cycle.

Annual reviews are recommended for Council as a general monitoring process. Council may also take advantage of the NSW Office of Water's TBL Performance Report to provide general information in the form of an annual monitoring process.

The next IWCM cycle will confirm if the IWCM recommended actions have effectively addressed CSC's identified issues.

6.6 Recommendations

The PRG recommended CSC to implement the preferred scenario described in Table 29 according to the Action Implementation Plan in Section 6.4.

Addendum

Towards the completion of this Joint IWCM Strategy Study, Cabonne Shire Council provided additional information of a Molong Water Loss Management Program which was finalized in May 2011. The program installed flow meters and loggers to provide permanent metering and continuous monitoring to the Molong Water network. The analysis concluded that from a total of 17 leaks and bursts detected by leakage contractors, the actual water saving would be 44.2 ML per year. The Council indicated that further investigate and monitor of the water saving volume against Molong water usage would be required over a 12 months implementation of the Molong Water Loss Management Program.

It is noted that the anticipated actual water saving value through the Molong Water Loss Management Program would reduce the Molong water supply demand and increase Molong Water Supply security.

7 Regional Water Security - Centroc Perspective

Central Tablelands Water, Weddin, Blayney and Cabonne Shire Councils are members of the Central NSW Regional Organisation of Councils (Centroc).

In 2009, Centroc prepared a Water Security Study which reviewed the potential regional water supply systems and recommended a preferred regional strategy to improve water supply security in the Centroc region (Strategy F2a).

This section of the Detailed Strategy Study compares the water issues and preferred actions from this IWCM study with the Centroc Water Security Study's major recommended strategy F2a options. This will provide Councils with a comprehensive view of the IWCM outcomes together with the Centroc Water Security Study recommendations.

7.1 Centroc Preferred Strategy

The regional study identified several long term region-wide strategies. Option F2a was chosen as the preferred strategy. This strategy involved development of a Lake Rowlands Regional Network together with local options and supply to Cadia Hill.

The preferred strategy Option F2a included the augmentation of Lake Rowlands to cater for and supplement a regional supply to Central Tablelands Water, Orange, Cowra, Forbes, Parkes, as well as providing water for mining demand at Cadia Hill. This strategy also included local options to eliminate water security gaps not addressed by the regional pipeline network.

Option F2a included construction of:

1. Lake Rowlands Augmentation (from 4,500 ML to 26,500 ML)
2. Lake Rowlands to Orange Pipeline via Millthorpe (including duplication of trunk mains X and F)
3. Orange-Molong Creek Pipeline
4. Lake Rowlands to Forbes and Parkes Pipeline via Gooloogong (including duplication of trunk mains P and C)
5. Woodstock-Cowra Pipeline
6. New minor storage at Cumnock
7. New minor storage at Yeoval
8. New minor storage at Condobolin (off-stream from Lachlan River)
9. Burrendong-Wellington Pipeline

10. New minor storage at Lake Cargelligo
11. Lachlan River-Lake Cargelligo Pipeline
12. Chifley-Bathurst Pipeline
13. Chifley-Oberon Pipeline
14. Belubula Creek-Cadia Hill pipeline (already available)

Selected Centroc preferred options and their corresponding option numbers are marked in Figure 7.

Demand Management

Beyond capital works solutions, the Centroc Water Security Strategy also included a strong recommendation for member councils to progress demand management.

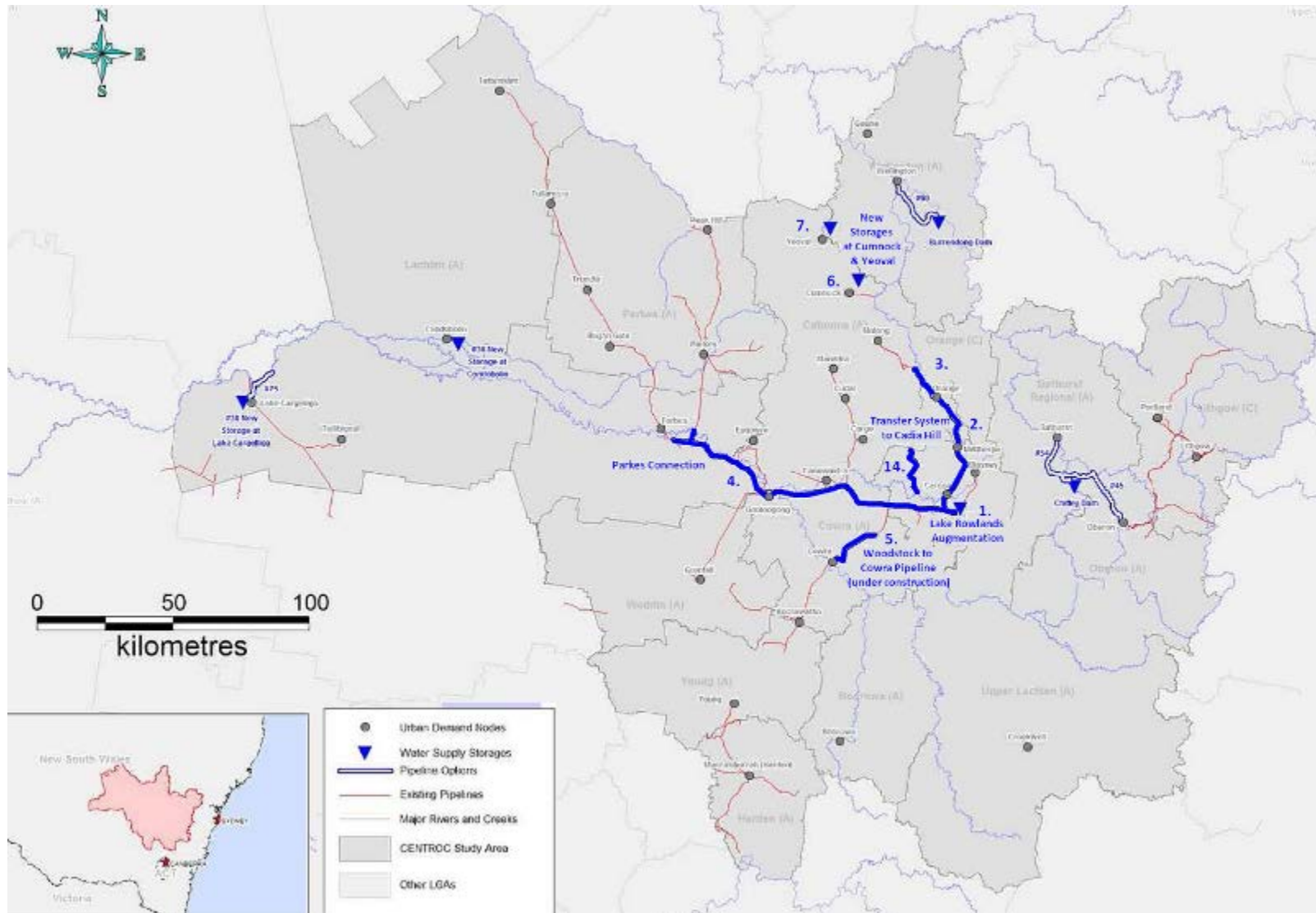


Figure 7: Centroc Water Security Study Preferred Option F2a

(Source: CENTROC Water Security Study - Component 2, Oct 2009; diagram has been modified for this document)

7.2 Centroc Preferred Scenario that Overlaps IWCM Options

Details of the Joint IWCM selected scenarios or actions that overlap with the Centroc preferred strategy are summarised below.

Table 30: Centroc Preferred Scenario & IWCM Option Comparison

Issue	Joint IWCM Recommended Actions	Centroc Water Security Study	Comments
Central Tablelands Water			
IWCM Issue 4			
<p>Future water security:</p> <p>Based on historical information and 17 year old Lake Rowlands yield study, there will be 100 ML/year shortfall in supply at 2037</p> <p>CSIRO predicts 11% reduction in surface water availability in 30 years' time due to climate change. This would exacerbate the shortfall in supply.</p> <p>Although Drought is not a central IWCM issue recent experiences have indicated that CTW's drought security is a major concern.</p>	<p>CTW preferred IWCM scenario addresses this issue with the following actions:</p> <ul style="list-style-type: none"> ▪ low level Demand Management Package 1 ▪ Surface Water extraction Option to construct a river off take at Blayney Blue Hole and connect new pipelines to Blayney Water Filtration Plant (see Appendix D) 	<p>Centroc preferred strategy F2a, Option 1 - amplifying Lake Rowlands from current capacity of 4,500 ML to 26,500 ML.</p> <p>The Centroc study also recommended strategy actions to improve water security by the provision of new additional town water storage and a regional network of pipes...</p>	<p>The IWCM study recommendation does not overlap with Centroc or preclude the Centroc action. However if Lake Rowlands were augmented, the Blue Hole project might not be required.</p>

Issue	Joint IWCM Recommended Actions	Centroc Water Security Study	Comments
IWCM Issue 5			
<p>Future water security issues:</p> <p>Centroc drought security study identifying total audit of the potential water supply in the region and potentially recommending water supply schemes.</p> <p>Long term efficiency gains in irrigated agriculture</p> <p>The possibility of a second storage on the Belubula River.</p> <p>Potential for local sewage reuse schemes as an additional for water source</p>	(See previous issue)	(See previous issue)	The IWCM study recommendation is in line and does not preclude Centroc strategy
IWCM issue addressed in IWCM Evaluation Study by the 'business as usual' scenario.			
<p>Cowra pipeline connection to CTW to provide emergency water supply may impact on the timing of drought water restrictions imposed on CTW customers. The capacity for emergency pumping from Cowra to CTW will provide CTW with greater drought security.</p>	This is a Business as Usual Scenario as the pipelines development has been agreed and construction is underway.	Instead of providing water supply for emergency purpose, Centroc preferred strategy F2a, Option 5 –Woodstock-Cowra Pipeline proposed to supplement supply for Cowra, Koorawatha and surrounding communities with incorporation of Lake Rowlands Augmentation option.	This was a business as usual' scenario & IWCM preferred scenario does not preclude the Centroc option.
IWCM issue addressed in IWCM Evaluation Study by the 'business as usual' scenario.			
Demand management initiatives such as community education	This issue has been identified as a Business as Usual Scenario because CTW has commissioned the development of a Demand Management Plan.	Centroc study proposed the implementation of the preferred strategy was in addition to the ongoing implementation of the best-practice demand management programs for each Council.	The IWCM study recommendation is in line with Centroc strategy

Issue	Joint IWCM Recommended Actions	Centroc Water Security Study	Comments
Cabonne Shire Council			
IWCM issue SS23-CSC			
<p>CSC's TBL performance in urban population without reticulated water had exceeded the NSW median value in 2005/06. In 2008/09 CSC's TBL performance on this has also exceeded the NSW median value.</p>	<p>Two villages (Yeoval and Cumnock) have non-potable water supply. This is under consideration as a longer term issue.</p> <p>A feasibility study on the development of a minor capital works plan and the implementation of proposed actions identified in the feasibility study is recommended to address issues identified in the IWCM Studies.</p>	<p>Centroc recommended a new minor storage at Cumnock to store water from the Bell River to the surrounding villages. The storage is sized to provide sufficient water supply during an extended dry periods of up to 2 months.</p> <p>A new minor storage at Yeoval is proposed to store water from the Buckinbah creek and provide sufficient water supply to the village. The storage is sized to supply water during an extended dry period of up to 2.5 months.</p> <p>Implementation of these options would require completion of feasibility, concept and detailed design and construction processes.</p>	<p>IWCM recommendation is in line with Centroc strategy and does not preclude the Centroc recommendation.</p>
Resolved IWCM issue SS25-CSC			
<p>Molong Water Supply System appears to be secure for the next 30 years. However this may need review in the light of CSIRO's prediction of an 8% reduction in surface water flows in 30 years due to climate change in the Macquarie Catchment.</p>	<p>This issue has been addressed by the completion of the review of Molong Creek Dam safe yield study including consideration of the impact of climate change. The outcomes of this study should be considered in the next IWCM study. The preferred scenario includes Thistle St, surface water supply and demand management.</p>	<p>Centroc preferred strategy F2a, Option 3 - Orange-Molong Creek Pipeline proposed a 2-way transfer system with the intention to be primarily operated to supplement the supply at Orange.</p>	<p>IWCM recommendation may involve minor capital works and demand management. It does not preclude the Centroc recommendation.</p>

7.3 Discussion

A map of the IWCM study area is included in Figure 8. The following section includes discussions on the IWCM actions which overlap with the Centroc preferred strategy (Option F2a).

7.3.1 Central Tablelands Water (CTW)

Lake Rowlands Augmentation

CTW's IWCM preferred scenario has been identified to address CTW's future water security issue. The preferred scenario includes

Low level demand management (package 1) (see Appendix D): This includes the application of the following demand measures. These measures definitions are sourced from the Demand Side Management Decision Support System (DSS) Manual (July 2006):

- National Mandatory Water Efficiency Labelling Scheme (WELS),
- Community Education,
- Permanent Low Level Restrictions on Water Use (Water Conservation Measures),
- BASIX – Fixture Efficiency with Rainwater Use.

Utilization of the surface water supply from Blayney Blue Hole (see Appendix D): This involves constructing a river off take and new pipelines connecting to Blayney WFP.

This preferred scenario is expected to provide sufficient extra water supply for Central Tablelands up to 2034 without the need to augment Lake Rowlands' capacity from 4,500 ML to 26,500 ML. Beyond 2034, other less favourable (i.e. lower TBL rating) options may be considered to supplement additional water supply.

From the Centroc regional perspective, neither the IWCM preferred scenario nor other less favourable CTW IWCM options can provide an additional 2700 megalitre per annum for the entire Centroc region. This extra water would only be available with the major amplification of Lake Rowlands.

Cowra Pipeline

The IWCM issue relating to the Cowra-CTW pipeline impact on CTW's drought water restrictions timing was addressed in the IWCM as a Business as Usual Scenario. The pipeline connection between the CTW network and Cowra has proceeded through the planning process and is a committed action. It should be constructed shortly. The pipeline is expected to supplement supply for Cowra, Koorawatha and surrounding communities.

During extreme drought emergencies, the Centroc Water Security Study proposes a water supply network to Cowra that could, in the future, be extended to improve water security at Young and Harden. However this would only occur with the implementation of Lake Rowlands Augmentation option as the pipeline would be likely to reduce CTW's

ability to service customers during droughts. This would be likely to necessitate earlier water restrictions being imposed on CTW consumers in order to assist Cowra.

Demand Management

CTW's IWCM issue on initiating demand management was addressed by a Business as Usual Scenario. Further to that, the IWCM recommendation is in line with Centroc's preferred strategy of implementing the best-practice demand management programs for each Centroc Council.

7.3.2 Cabonne Shire Council

Cumnock & Yeoval Water Storage

The Centroc Water Security Study recommended a new minor storage at Cumnock to store water from the Bell River for the surrounding village. The storage was sized to provide sufficient water supply during an extended dry period of up to two months. Centroc also proposed a new minor storage at Yeoval to store water from the Buckinbah creek and provide sufficient water supply to the village. The storage is sized to supply water during an extended dry period of up to two and a half months. Implementation of these two options would require completion of feasibility, concept and detailed design and construction processes.

However, CSC has advised that there is an existing "turkey nest" off stream storage at Cumnock. Water is extracted from a natural water hole in the river. CSC has indicated that the Centroc recommendation of a minor storage at Cumnock will not be required.

CSC's IWCM recommendation of a feasibility study on the development of potable water supply to these villages is also in line with this Centroc recommendation. CSC currently supplies non-potable water to the villages Cumnock and Yeoval. CSC's preferred IWCM Strategy Study scenario recommended a feasibility Study for water supply to address the IWCM issue at Cumnock and Yeoval.

Molong Creek Dam

The review of safe yield at Molong Creek Dam and Borenore Dam is complete. This report addressed the IWCM issue to review Molong Water Supply System's water security for the next 30 years.

However, the Centroc Water Security Study preferred strategy F2a, Option 3 - Orange-Molong Creek Pipeline proposed a 2-way transfer system. The intention was to supplement the supply at Orange on transfer water to Molong from Orange Supplies & Lake Rowlands. This appears to be surplus to CSC's needs for Molong which can be addressed by the IWCM preferred scenario. The option to supplement Orange's water supply may affect Molong's water security if Lake Rowlands augmentation option does not proceed.

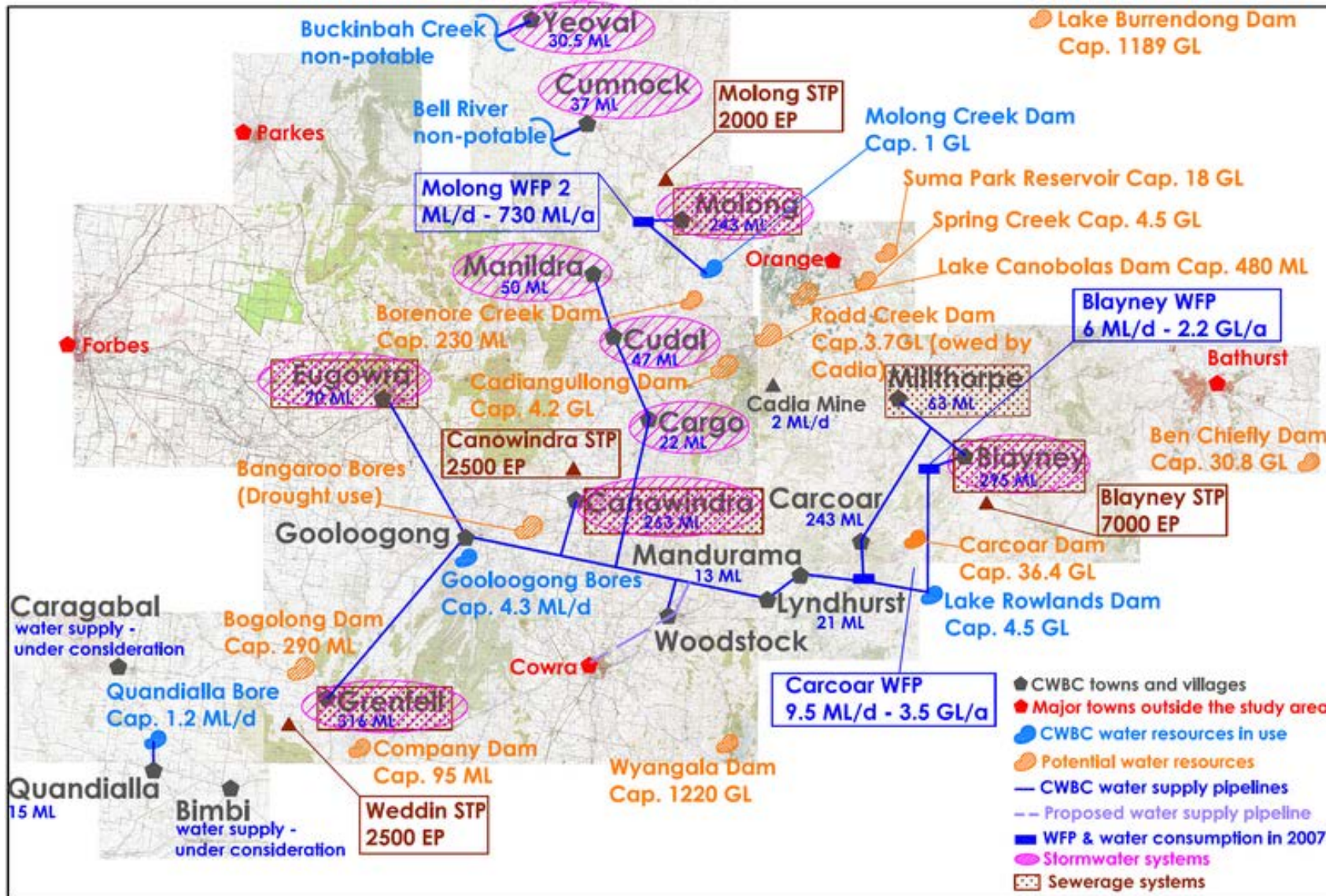


Figure 8: Joint IWCM Detailed Strategy Study Area Overview