Warrumbungle Shire Council

Draft

Water Demand Management Plan

warrumbungle
SHIRE COUNCIL

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1 EXECUTIVE SUMMARY

1.1 Introduction

The purpose of this Water Demand Management Plan is to provide guidance on how Council can best reduce the consumption of residential and commercial water in the Warrumbungle Council area.

By reducing the demand on the supply of water to customers Council can reduce its costs of production of potable water and assist in the preservation of valuable water resources particularly during droughts. Furthermore, as water related plant and facilities are replaced in the future, capital cost savings can be made because of the smaller required size.

1.2 Scope of Plan

The towns and villages covered by this plan include:-

Baradine
Binnaway
Bugaldie
Coolah
Coonabarabran
Coolah
Dunedoo
Kenebri
Mendooran
Merrygoen
Australian Astronomical Observatory *(raw water supply).*

Supply of water to other non-serviced villages and rural residents is addressed in Council's Drought Management Plan.

This Demand Management Plan is prepared in accordance with the Best-Practice Management of Water Supply and Sewerage Guidelines 2007 published by the New South Wales Office of Water.

1.3 Demand Monitoring

Council has a comprehensive data base that monitors water production on a daily basis for the larger centres. The accumulated data forms the basis for this Demand Management Plan.

1.4 Demand Forecasting

User pays has reduced the amount of water consumed by approximately 40% across the Shire since 1996/97 (based on Coonabarabran treated water records).

Consequently all water treatment facilities have sufficient capacity to meet maximum daily demand.

Based on the high treated water figures in 2012/2013 and the slowly declining population forecasts it is considered that for the purposes of planning the high treated water volume for 2012/2013 can be used to assess future maximum demand requirements.

Given the current condition of assets there are no major facility replacements forecast in the foreseeable future and hence there is time to gain more certainty regarding future maximum demands that need to be considered in designing future facility upgrades and replacements.

1.5 Demand Management Planning

Demand management addresses the following:-

- User Pays
- Restrictions
- Recycled Effluent
- Community Education
- Pricing
- Leak Reduction
- Review of Restrictions Policy
- Water Tanks
- Building Codes
- Council Irrigation Practices
- Recycled Effluent
- Stormwater Recycling
- Water Sensitive Urban Design
- Evaporative Air Conditioners.

1.6 Implementation of Demand Management Initiatives

It is recommended Council focus on three (3) demand management measures over the next two years.

These are a Community Education in partnership with its Alliance partners and Leak Reduction in the pipe network, and minimisation of unmetered supply.

Furthermore, if Government Incentives become available further investigation of Effluent and Stormwater Recycling should be investigated.

1.7 Other Considerations

One of the unintended consequences of reduced water demand is the reduction of flows in the pipe network resulting in lower chlorine levels particularly at the extremities of the system. Dead ends in the extremities of the pipe network will be most affected and Council has implemented a construction program to remove such dead ends, which will provide better circulation of water and also improve water quality. Where it is not feasible to remove dead ends it will be necessary to carry out routine flushing in order to maintain water quality. Naturally this is counter intuitive to the goal of reducing unmetered losses.

Another possible side effect of user pays price signalling is the reluctance of residents to maintain the grassed verges in front of their properties, which can impact on the aesthetic appeal of the towns and villages.

1.8 Recommendations

The plan addresses both the supply and consumption sides of the provision of water services.

On the Council supply side the plan recommends that Council:-

- **Implements a Leak Reduction Program in order to identify losses of water in the pipe network and implement a program to fix all significant water leaks, in accordance with recommendation of the Water Management Plan (WMP).**
- **Investigate potential effluent and stormwater reuse for outdoor uses over the longer term.**

On the customer demand side this plan recommends that Council:-

- **Participate in a communications strategy with its Water Alliance partners to educate residents and businesses on how to reduce water usage.**
- **Provide incentives for consumers to install water efficient devices, water tanks and other water saving measures where it is cost effective to do so.**
- **Review its irrigation practices, investigate further use of drought tolerant plants in public spaces and encourage water sensitive urban design in future new developments and refurbishments of streetscapes. Sub-surface irrigation of sporting fields may also be a possibility, if government subsidies to assist with capital costs are forthcoming in the future.**
- **Review its current Water Restrictions Policy during periods of drought with a view to improving the reliability of supply.**
- **Consider how far to encourage conservation of water with due regard to the aesthetics and the community benefits of well maintained and watered parks and gardens and sporting fields that contribute towards the quality of life in rural centres.**

2 DEMAND MONITORING

2.1 Treated Water and Plant Capacity

The main aspects of demand monitoring are addressed by regular metering of supply of water from treatment facilities and metering of customer usage. Metering of water supplied by treatment facilities at all major supply centres is carried out on a daily basis. At the smaller centres of Kenebri, Bugaldie and Merrygoen the amount of produced water is not monitored.

The consumption of water has been individually metered at all larger centres since 2007 when the installation of meters was completed. There have been periods where some bulk meters were unserviceable and interpolation has been used.

Meter reading and billing is carried out quarterly for all centres.
The following table shows the produced quantities of potable water at the main urban centres of Coonabarabran, Coolah, Dunedoo, Baradine, Binnaway and Mendooran since 2006/7.

Treated Water (MgL)											
Location	**2006/ 2007**	**2007/ 2008**	**2008/ 2009**	**2009/ 2010**	**2010/ 2011**	**2011/ 2012**	**2012/ 2013**	**2013/ 2014**	**2014/ 2015**	**2015/ 2016**	**2016 2017**
Coonabarabran	452	383	352	375	333	335	452	400	437	473	437
Coolah	180	128	131	136	114	129	135	151	128	151	154
Dunedoo	217	175	208	238	258	206	241	257	195	199	237
Baradine	171	153	166	166	110	100	155	141	166	237	141
Binnaway	87	67	85	85	84	76	85	141	147	99	91
Mendooran	77	84	110	100	90	85	46*	40	56	61	64
Bugaldie	4	4	3	3	3	3	3	3	5	3	3
Kenebri	3	3	3	4	2	3	7	5	5	4	3
Merrygoen	8	5	5	5	3	3	3	3	5	13	10
Total	1,119	1,002	995	1,052	937	882	1,133	1,141	1,144	1,240	1,140

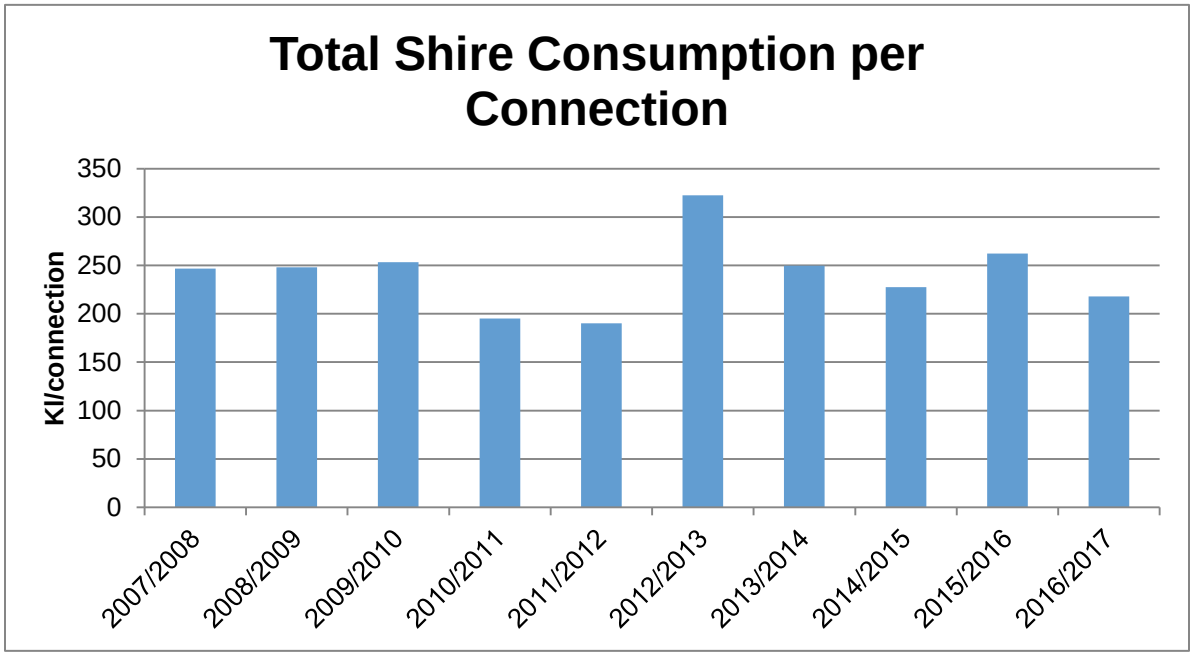
**estimated*

The following table provides information regarding the plant capacity at each centre compared with the maximum daily demand over the last three years. All systems have sufficient plant capacity.

Location	Number of Connections	Maximum Treated Water Capacity (MgL/day)	Maximum Demand in Last Three Years (MgL/day avge over a 3 day period)	Reservoir Capacity
Baradine	360	1.5	1.3	1X1.1 MgL Concrete
Binnaway	280	1.3	0.63	1X1MgL Concrete
Bugaldie	14	.037	N/A	1X0.02MgL Poly Tank
Coolah	460	1.9	1.0 (2009)	1x1.14MgL+2x0.11MgL Concrete Total 1.36MgL
Coonabarabran	1350	7.0	1.75 (max 3.0MgL/day)	1x4.0MgL+1x1.1 mGl+1X2.0MgL Concrete Total 7.1 MgL
Dunedoo	460	2.5	1 (estimated)	1x0.85 MgL +2x0.23 MgL Concrete Total 1.33 MgL
Kenebri	13	.051	N/A	2x .012 MgL galv Total .024 MgL
Mendooran	220	1.0	.5 (estimated)	1x0.6MgL steel+2x.05MgL concrete+1x0.35 MgL concrete Total 1.4MgL
Merrygoen non-potable	25	N/A	N/A	Old Railway steel storage tank Approx .2 MgL
Warrumbungle National Park	1	N/A	N/A	N/A
Total	**3351**			**12.02 MgL**

2.2 Metered Water and Unaccounted for Losses

The following graph shows annual metered water consumption per connection for all centres since 2006/7.



It is evident from the graph that the wet summers in 2010 and 2011 reduced demand with resultant lower water bills. With the onset of the dry 2012 summer demand increased and it is expected that the “bill shock” will reduce usage in future dry summers.

The following table shows the difference between the produced water and metered water for all serviced areas in 2012/13.

	Treated Water (MgL)	Metered MgL	% of Unaccounted Water	Avge KL's per Connection	Number of Connections 2016
	2016/17	**2016/17**	**2016/17**	**2016/17**	**2016/17**
Coonabarabran	437	309	29.29%	227.20	1360
Coolah	154	92.5	39.94%	190.72	485
Dunedoo	237	115	51.48%	239.58	480
Baradine	141	102	27.66%	281.76	362
Binnaway	91	51.8	43.08%	176.79	293
Mendooran *	64	34	46.88%	137.10	248
Bugaldie *	3	1.6	46.67%	133.33	12
Kenebri *	3	1.5	50%	107.14	14
Merrygoen *	10	2.7	73.00%	108.00	25
Total	**1,125**	**710**	**37.71%**	**216.53**	**3279**

**estimated*

The main reasons for unaccounted water are:

- Leaks in the pipe network
- Faulty meters
- Mains Breaks
- Flushing
- Illegal connections

The amount of unaccounted water in Dunedoo and Binnaway indicates that further investigation of the reasons needs to be undertaken in the near future.

Initial investigation of the reasons can be carried out by firstly checking meter readout reports for faulty meters and replacing these.

Any meters over 10 years of age should be replaced by implementing a meter replacement program.

These first two measures do not actually save water but do provide equity to customers.

In order to establish an appreciation of the amount of water lost through leaks in the network a first step is to carry out reservoir “drop tests” in the middle of winter and late at night when consumption is at its lowest. A drop test involves measuring the drop in water levels in each reservoir over a two hour period. Having carried out these tests it may be necessary to carry out a leak detection program to identify the location of specific leaks and following up with a repair program.

2.3 Consumption by Demand Category

An analysis of the water consumption in 2016/17 by demand category for metered supplies is as follows:-

Residential	514.5 MgL	(72%)
Non Residential	195.7 MgL	(28%)

Further information on the consumption per classifications of commercial, industrial, institutional and rural is not available at this time

3 DEMAND FORECASTING

3.1 Overview

Future demand is influenced by the following factors:-

- Population trends
- Climate variability
- Commercial development (particularly if large water consumers)

The Shire's population has declined by some 6.3% in the 5 years preceding the 2011 census years according to the Bureau of Statistics.

Climate variability has resulted in a 26% increase in demand in 2012/13 compared to the relatively wet summer years of 2010/11 and 2011/12.

At this stage there is no indication of major water users locating to the Shire.

3.2 Population Growth Projections

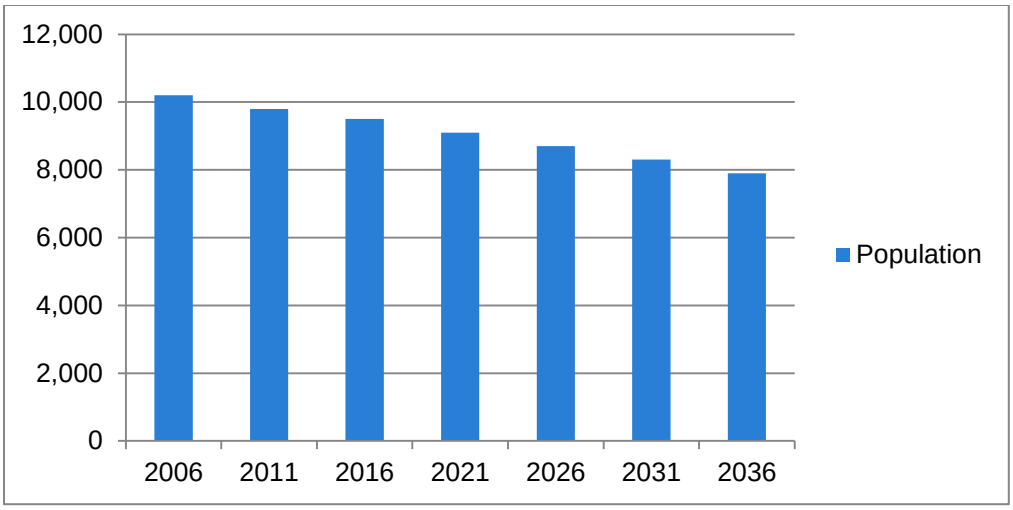
The estimated current population in each urban centre is based on the ABS 2011 census. Note that the population census uses districts rather than centres. In some cases the districts extend well beyond the town limits and are not supplied with reticulated water.

Urban area	Population
Baradine	680
Binnaway	400
Coolah	910
Coonabarabran	2500
Dunedoo	840
Mendooran	400
Bugaldie	29
Kenebri	68
Merrygoen	33
Neilrex	19
Leadville	62
Ulamambri	50
Total Urban Population	**6661**

The urban centres contain some 6660 people. The remaining third of the shire population lives outside urban areas.

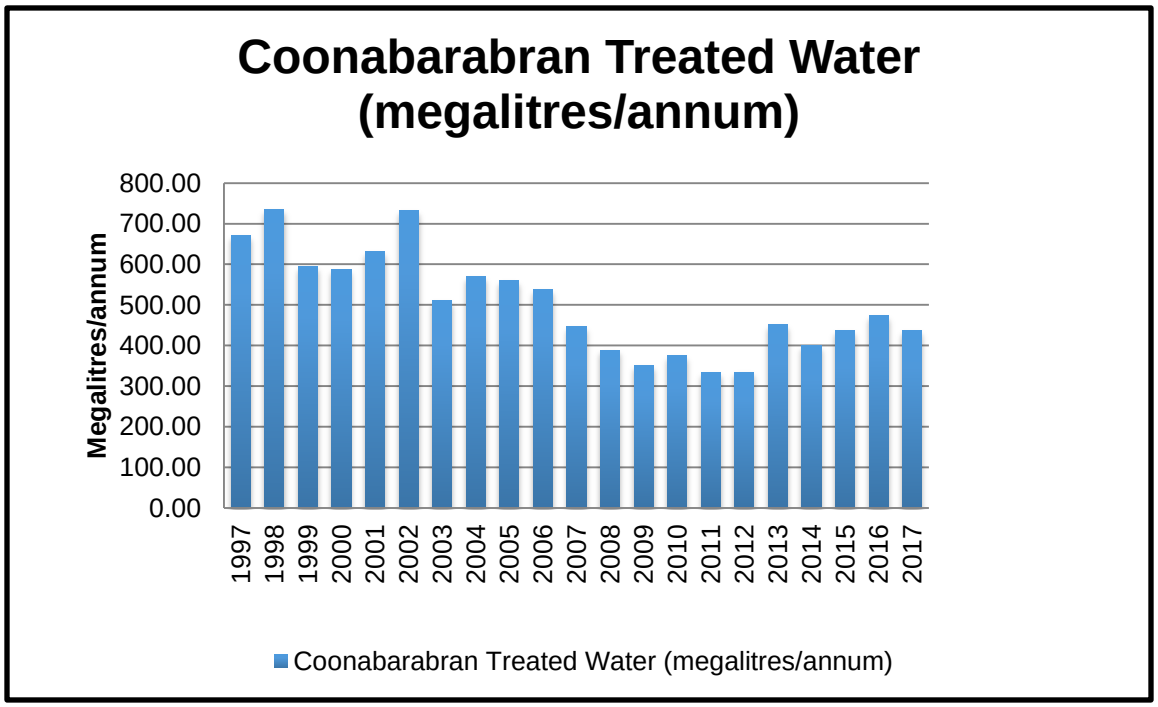
One main area of concern is the demographic trend of declining population. Should the Department of Planning forecasts eventuate there will be an 18% decline in population by 2036 with a corresponding decline in water usage meaning a real increase in user charges to meet ongoing operations ,maintenance and asset replacement costs.

According to the DP&I report, Warrumbungle Shire Council's population has been predicted to decrease from roughly 10,236 in 2006 to roughly 7,900 in 2036. According to the 2011 census the Shires population was 9588 in that year.



3.3 Water Consumption Trends per Assessment

The amount of water treated for the township of Coonabarabran clearly demonstrates the effectiveness of user pays. The high usage 2012/13 is considered an anomaly and will correct in future years.



Water consumption has continued to decline since the implementation of user pays.

In Coonabarabran in 1996/97 the average annual consumption of raw water was 510 Kilolitres per connection. User pays was fully implemented in 2007 and the average annual consumption per connection over the last 5 years has been 273 Kilolitres or a reduction of 46%. The average Shire wide in 2011/12 was 320 Kilolitres. While the consumption declined in 2010/11 and 2011/12 it is considered that the relatively wet summers were the main reason.

This conclusion is supported by the jump in consumption in 2012/13 when the summer months were very dry resulting in an average annual consumption of raw water of 362Kl/connection. It is expected that the price shock of the increased bills for 2018/19 will result in lower consumption even in future dry summers.

Town / Village	Metered Kilolitres per Connection										Number of Connections 2017
	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	
Baradine	332.71	335.53	330.81	311.17	242.92	328.86	343.50	298.01	360.25	281.62	365
Binnaway	158.98	193.06	220.18	162.01	142.90	184.27	192.25	192.96	216.28	176.78	294
Bugaldie	269.09	183.20	251.91	243.40	193.73	224.73	304.50	188.58	158.46	132.42	12
Coolah	253.24	243.35	259.67	177.43	182.19	232.11	219.65	194.06	230.53	194.19	488
Coonabarabran	237.09	233.43	242.67	192.48	200.46	429.30	262.86	243.86	280.74	227.16	1,364
Dunedoo	300.44	311.78	291.64	201.72	208.81	289.69	263.91	233.85	266.28	239.02	482
Kenebri	231.00	231.00	281.54	113.38	190.07	236.21	176.14	138.43	134.29	107.50	14
Mendooran	157.82	157.82	157.82	157.82	157.82	157.82	157.82	157.82	157.82	157.82	245
Merrygoen	179.92	183.70	172.33	179.92	104.96	130.88	158.16	132.32	184.96	108.12	25
Total Shire	**235.59**	**230.32**	**245.40**	**193.26**	**180.43**	**245.99**	**230.98**	**197.77**	**221.07**	**180.51**	**3,289**

Given the relative short history of metered supply which was completed in 2007 and the two unusual cool and wet summer years of 2010 and 2011 it is difficult to forecast any trends in consumption at this stage. It will be necessary to monitor water consumption during future hotter drier years in order to get a better prediction of water consumption into the future.

However with population trending down and charges increasing in real terms it is reasonable to assume that overall water consumption will not increase beyond 2012/13 levels in the foreseeable future unless a major water consumer locates into the area.

It is considered that increases in demand due to climate variability in the foreseeable future will be more than offset by decreases in demand caused by predicted population decline and predicted real increases in charges.

4 DEMAND MANAGEMENT PLANNING

4.1 Overview

This section addresses what measures are currently in place to control demand on Council's water supplies and looks at what further measures can be implemented.

More can be done to reduce unnecessary waste on the consumer side including:

- More education of the community
- Incentives to install water saving devices
- Better irrigation and gardening practices

4.2 Current Management Measures

4.2.1 User Pays

Council has been moving towards Best Practice with 50% of income derived from user charges and is committed to implementing a planned 50% of income to be derived from user charges commenced in 2014/15.

In 2017/18 Council budgeted for 53% of income was derived from user charges due to the unusually dry summer period. Charging for actual use of water has been the single most effective means of reducing raw water demand in Coonabarabran from 510 Kl/annum per connection in 1997 to an average of 273 Kl/annum per connection over the last 5 years.

4.2.2 Restrictions

The use of restrictions during dry periods has proven to be most effective in reducing demand especially during the higher levels of restrictions. During the 2002/03 drought Level 4 restrictions reduced demand by 60% compared to times of no restrictions and the current Level 6 restrictions have further reduced demand by a further 10%.

Council's website requests the community to abide by voluntary restrictions all year round and includes measures such as:-

- Watering gardens in cooler hours between 6pm and 8 am
- No hose wash-down of paved areas.

4.2.3 Recycled Effluent

Council currently uses approximately 120 Mega litres per annum (or 50 %) of the treated effluent from the Coonabarabran Sewage Treatment Plant to irrigate the Native Grove Cemetery.

4.2.4 Community Education

During the early stages of the 2000-2003 drought Council participated in regional Waterwise TV campaigns.

In October 2002 Council offered the free installation of Selecta Flush devices to Coonabarabran residents. These devices provide the dual flush option in toilet cisterns.

In October 2003 issued a Water Conservation Article to the Community that outlined several ways of conserving water.

4.3 Future Demand Initiatives and Evaluation

4.3.1 Community Education

It is recommended that a water wise program be again implemented given the significant dry period now. The community is ready to accept advice on methods to save water. Planning for this education program should commence as soon as possible ready for the next dry period. This program could be carried out with Council's Water Alliance partners Gilgandra and Coonamble in order to provide economies of scale.

There are many ways to reduce demand as outlined in the article issued by Council in October some years ago.

Some of the advice that can reduce water wastage includes:-

- Fix dripping taps and leaking toilet cisterns
- Water gardens in the cooler parts of the day
- Mulch garden beds to retain moisture-Council could supply free mulch from its green waste collection.
- Choose plants that require less water
- Use a timer on garden sprinklers
- Cover swimming pools to reduce evaporation
- Take shorter showers
- Wash the car on the lawn
- When buying new appliances look for ones that are water efficient
- Maintain evaporative air conditioners and only cool those parts of the home that are regularly used. Consider reverse cycle air conditioning when replacing the system.
- Check for leaking under ground pipes by reading the water meter last thing before going to bed and again early in the morning before any taps are turned on.

The cost of an appropriate ongoing education program in cooperation with Alliance member Councils could be budgeted at $5000/annum. At a marginal price of $0.70/Kl to produce additional water it would be necessary to save approximately 7 Mega litres per year or less than 1% of yearly usage.

4.3.2 Pricing

Best Practice provides for adoption of a policy whereby 50% of the income for Warrumbungle Water is derived from user charges.

4.3.3 Leak Reduction

As part of the proposed Water Management Plan it will be recommended to check the pipe network for leaks. This is best done checking reservoir levels (called drop tests) over a two hour period late at night in mid winter. If the water level in the reservoirs drops by an amount exceeding what would be normal night time use then the next course of action is to carry out a leak detection survey.

Current differences in treated water versus billed water in Dunedoo and Binnaway indicate there is a significant amount of unaccounted for water. The unaccounted for water may be due to many factors including:

- Leaking pipe network
- Faulty meters

- Illegal connections

The cost of carrying out the reservoir drop tests at the six (6) larger centres is estimated to be $5,000.

The engagement of a specialist through the Lower Macquarie Water Utilities Alliance (LMWUA) to identify the location of significant leaks will provide the basis for action. The engagement of the consultant is now in hand and Council's cost is $14,400. Fixing the leaks is normally carried out within the normal maintenance vote. If leakage can be reduced by 40Mgl/annum or 5% of total produced water the savings in water production costs would be in the order of $25,000 per annum.

4.3.4 Review of Restrictions Policy

It is recommended Council review its water restrictions policy with a view to reducing demand on water supply.

Council's current policy is to start mandatory level 1 restrictions when Timor Dam reaches 70% capacity. It is recommended that restrictions commence if Timor Dam reaches 80% of capacity leading into a predicted El Nino Summer event.

It is also recommended that part of Council's education campaign be to reinforce its request for voluntary water restrictions at all times as advertised on its website.

4.3.5 Water Tanks

It is recommended that the installation of water tanks for external use only be further investigated. Dubbo carried out a feasibility study into the use of water tanks and established it was not viable for consumers to install them. Polytanks have come down in price to the point where a 10,000 litre tank now costs $2,500 (allowing $1,000 for installation) and an average home can save approximately 110 Kilolitres per annum. At $1.70 /Kilolitre there is a potential saving of $200/year.

While still taking 12.5 years to repay the capital cost (ignoring loss of interest on investment) if Government subsidies are reintroduced there may well be a significant incentive to install water tanks.

It is not considered beneficial for Council to provide substantial subsidies to install water tanks.

4.3.6 Building Codes

The introduction of BASIX encourages the installation of water tanks for new developments however this not likely to have a significant impact on demand due to the low level of new development in the Shire at this point in time.

There is no cost to Council involved in BASIX.

4.3.7 Council Irrigation Practices

The importance of well grassed sporting ovals is a vital part of community life in rural areas. Significant savings in watering sporting fields can be achieved using sub surface irrigation however without Government incentives the capital cost is excessive.

Council should lobby where possible for government incentives to improve irrigation efficiencies for public spaces.

Council should also review its current irrigation procedures to establish if a more efficient method is feasible. Selection of drought tolerant plantings should also be considered.

4.3.8 Recycled Effluent

It is recommended further investigations be carried out regarding further usage of treated effluent from the Coonabarabran Sewage Treatment Plant.

Investigations should also be carried out regarding usage of effluent at Coolah and Dunedoo where there has been interest in using the effluent to water the Golf course.

Detailed feasibility studies are normally expensive and a first step maybe to apply for a government grant to carry out such a study.

4.3.9 Stormwater Recycling

Some major centres such as Orange and Dubbo have invested in Stormwater recycling. It is worthwhile carrying out preliminary investigations to establish if stormwater recycling is viable, especially if a level of Government funding is provided. Again feasibility studies are normally expensive and a first step maybe to apply for a government grant to carry out such a study. Allow an initial contribution of $5000 from Council.

4.3.10 Water Sensitive Urban Design

Water sensitive urban design is a means of using stormwater to irrigate public areas and can be carried out on a small or large scale. In a simple example run off from a street can be directed to provide water for street scape plantings rather than being directed to stormwater pipes. The environment can benefit when runoff from highways is diverted to planted areas rather than to rivers via stormwater pipes.

The cost of implementing such design practices varies from site to site and would need to be assessed on a case by case basis.

4.3.11 Evaporative Air Conditioners

On an annual basis evaporative air conditioners can use approximately 50 Kilolitres per annum. It is important that evaporative air conditioners are correctly maintained. The importance of maintaining and efficiently operating evaporative air conditioners can be emphasised as part of an education programme.

5 IMPLEMENTATION OF DEMAND MANAGEMENT INITIATIVES

5.1 Timetable and Costs.

It is recommended Council focus on two demand management measures over the next two years. These are a Community Education in partnership with its Alliance partners and Leak Reduction in the pipe network.

Furthermore if Government Incentives become available further investigation of Effluent and Stormwater recycling should be investigated.

A suggested 5 year plan is provided below.

Item	2018/19	2019/20	2020/21
Community education	$5,000	$5,000	$5,000
Leak Reduction-carry out reservoir drop tests	$5,000		
Leak Reduction- leak detection in pipework in identified centres and repairs completed.	$25,000		
Investigate feasibility of installing water tanks		$3,000	
Investigate feasibility of effluent recycling		$5,000-based on Government subsidy	
Investigate feasibility of storm water recycling		$5,000-based on Government subsidy	
Review Demand Management Plan and effectiveness of Demand Management Measures		$5,000	$5,000
Total Council Cost	**$35,000**	**$23,000**	**$10,000**

APPENDIX 1 GLOSSARY OF TERMS

ABS	Australian Bureau of Statistics
EPA	Environmental Protection Agency
Kl	Kilolitre - 1000 litres
MgL	Mega litre - 1 million litres
NA	Not available
STP	Sewage Treatment Plant
WTP	Water Treatment Plant

APPENDIX 2 REFERENCES

1) Department of Primary Industry – Water – Best-Practice Management of Water Supply and Sewerage Guidelines, 2015
2) Bureau of Meteorology Website — Historical Temperature and Rainfall Data
3) Integrated Water Cycle Management Evaluation Study, May 2011
4) Water Sharing Plan for the Castlereagh River (DPI Water 2012).
5) Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012
6) Water Sharing Plan for the Namoi Unregulated and Alluvial Water Sources 2012

APPENDIX 3 TIMOR DAM CAPACITY