2016 Demand Management Plan

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Report Details

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Document History and Status

Revision	Report Status	Prepared by	Reviewed by	Approved by	Issue Date
A	1st Draft	C Smith			30-Nov-15
B	2nd Draft	C Smith	TRC	C Smith	14-Mar-16
C	Final Draft	C Smith	TRC	C Smith	24-Mar-16
D	Public Exhibition Draft	C Smith and TRC	TRC	Council	23-Apr-16
E	Final	TRC	TRC	Council	14-June-16

Overview & Purpose

The 2016 revision of the Demand Management Plan has been prepared as a major update to the previous Plan which was originally prepared in 2007. The Plan has been prepared based on a template that was prepared for the Namoi Water Alliance by Hunter H2O for the purpose of providing a consistent approach to demand management across the Namoi Region. The template was prepared following the preparation and adoption of a Drought Management Plan template in early 2015 (Hunter H2O, 2015).

The Demand Management Plan has been prepared in accordance with NSW Department of Primary Industries – Water (DPI Water) requirements, as documented in their *Best Practice Management of Water Supply and Sewerage Guidelines* (DWE, 2007). With recent changes to best practice requirements, Demand Management can now be considered within Council's Integrated Water Cycle Management (IWCM) Strategy and also evaluated and updated as part of Council's Strategic Business Plan (SBP). However, TRC considers it more practical to have a standalone Demand Management Plan that can be reviewed and updated as required, as updates may not necessarily line up with updates to Council's IWCM (now required every eight years).

The fundamental objective of preparing and adopting a Demand Management Plan is to encourage efficient water use through the adoption of various demand management measures. This Plan outlines the various water conservation measures that are to be employed by Council in order to ensure that town water demand levels are both efficient and sustainable. By employing effective demand management measures, Council can expect significant reductions in water supply system capital and operating costs, along with the environmental and social benefits associated with maximising urban water efficiencies.

This Demand Management Plan has been developed in association with a Drought Management Plan, which focuses on both the demand and supply side measures that should be employed during drought periods. Consequently, during drought periods there is an overlap between the two plans. The Demand Management Plan and all rebates and offers contained within are only applicable to customers connected to the reticulated town water supply systems operated by TRC, including Dungowan Pipeline and Connors Creek Dam Pipeline raw water customers.

DEMAND MANAGEMENT PLAN - DOCUMENT CONTROL TABLE

Revision	***Revision Date*** *(from when Revision Applies)*	***Resolved by Council*** *(date of Council Meeting)*
Draft Report (for public exhibition)	12 April	12 April 2016
Final Report	14 June 2016	14 June 2016
Revision 1	-	-

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1 Introduction

Demand management is an essential component of modern water resource planning and management. The implementation of a comprehensive Demand Management Program provides benefits to customers, council and the environment, including:

- Reduced customer costs due to water savings (lower water & wastewater charges) and energy savings (lower energy charges)
- Reduced long-term costs for providing water due to avoided or delayed water supply infrastructure
- Reduced environmental impacts due to lower water extractions and lower energy usage

This Demand Management Plan has been prepared by Council to ensure a structured and consistent approach is taken for the promotion of demand management initiatives across the region. The Plan includes Council's Demand Management Program, which includes a range of water conservation measures that Council will be targeting to ensure that future town water demand levels are both efficient and sustainable.

The Plan is only applicable to customers connected to the reticulated water supply systems and some raw water pipelines operated by TRC, which includes systems operated in the following towns:

- Tamworth
- Moonbi / Kootingal
- Manilla
- Barraba
- Nundle
- Attunga
- Bendemeer.

Management of water supply in NSW is administered by the *Water Management Act 2000, Water Act 1912* and *Local Government Act 1993*. Demand management planning is an essential component of the NSW Government's *Best Practice Management of Water Supply and Sewerage Guidelines* (DWE, 2007) for local water utilities. This Demand Management Plan has been prepared in accordance with these guidelines and the associated Water Conservation and Demand Management Check List.

This Plan contains the following sections:

Section 2 contains a brief review of historical demands and considers the key influences on demands.

Section 3 contains a summary of current situation with water demands, including a breakdown of demands, benchmark data for residential consumption, water loss estimates and an overview of current demand management initiatives.

Section 4 contains 30-year demand forecasts Tamworth.

Section 5 contains a summary of the Demand Management Program along with further details for each demand management measure.

Section 6 outlines the steps for implementing and monitoring the Demand Management Program.

Section 7 contains the references to this report.

2 Historical Water Use

Historical water consumption is influenced by a variety of factors, including:

- Prevailing climatic conditions and climate change (refer to **Appendix A**)
- Residential and non-residential development
- Planning regulations for new developments
- Demand management measures
- Restriction rules during periods of drought
- Living standards, incomes and lifestyle factors.

With most of the above factors influencing demand at any given time, it is difficult to directly attribute changes in historical demand patterns to any one factor. Consequently, a general assessment has been made of the major influences of demand over the last 10-15 years.

The figure below shows the total annual water production for Tamworth water supply system since 2000/01. The figure shows that average water consumption over the last 15 years was 8,725 ML/a, with demands generally in the range of 8,000 ML/a to 10,000 ML/a in the majority of years. Demands reduced significantly during and immediately following the severe drought period from 2005 to 2007, with severe level 5 restrictions applying for several months in 2007. Demands have been relatively static since the severe drought event, in part due to the introduction of a comprehensive demand management program in 2007, which has seen significant residential and non-residential water savings through a combination of education and retrofitting with water efficient fixtures. Despite demands being relatively steady over the past 10 to 15 years, residential connections have increase by around 20% during this time.

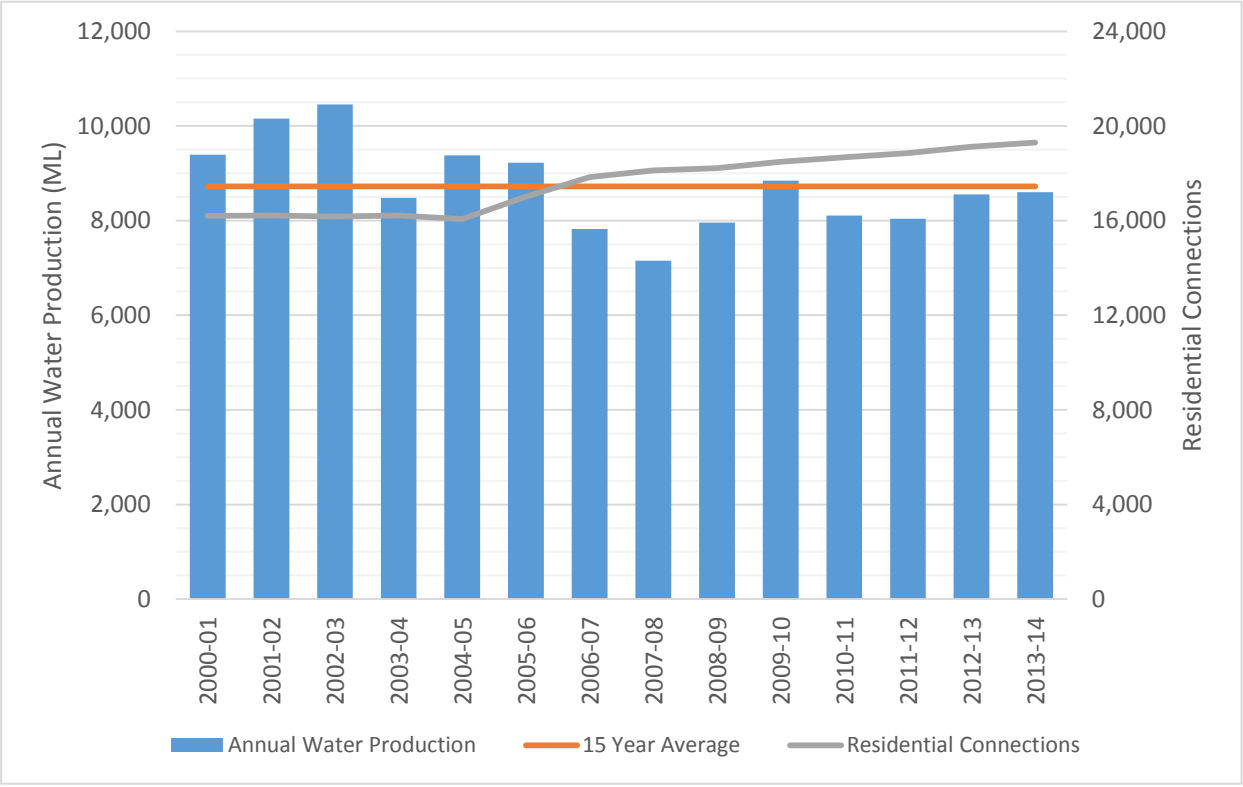

Figure 2.1 Annual Treated Water Production – Tamworth Water Supply (15 years)

The impact of the severe drought from 2005 to 2007, combined with the introduction of the demand management program can also be seen in the figure below, which shows how average annual residential water usage per property has changed over the last 10 years. Prior to 2005, residential usage was around 350 kL/a. However, over the last six years residential usage has dropped to around 240 kL/a on average and despite the dry conditions over the last two years, residential usage has still not exceeded 300 kL/a.

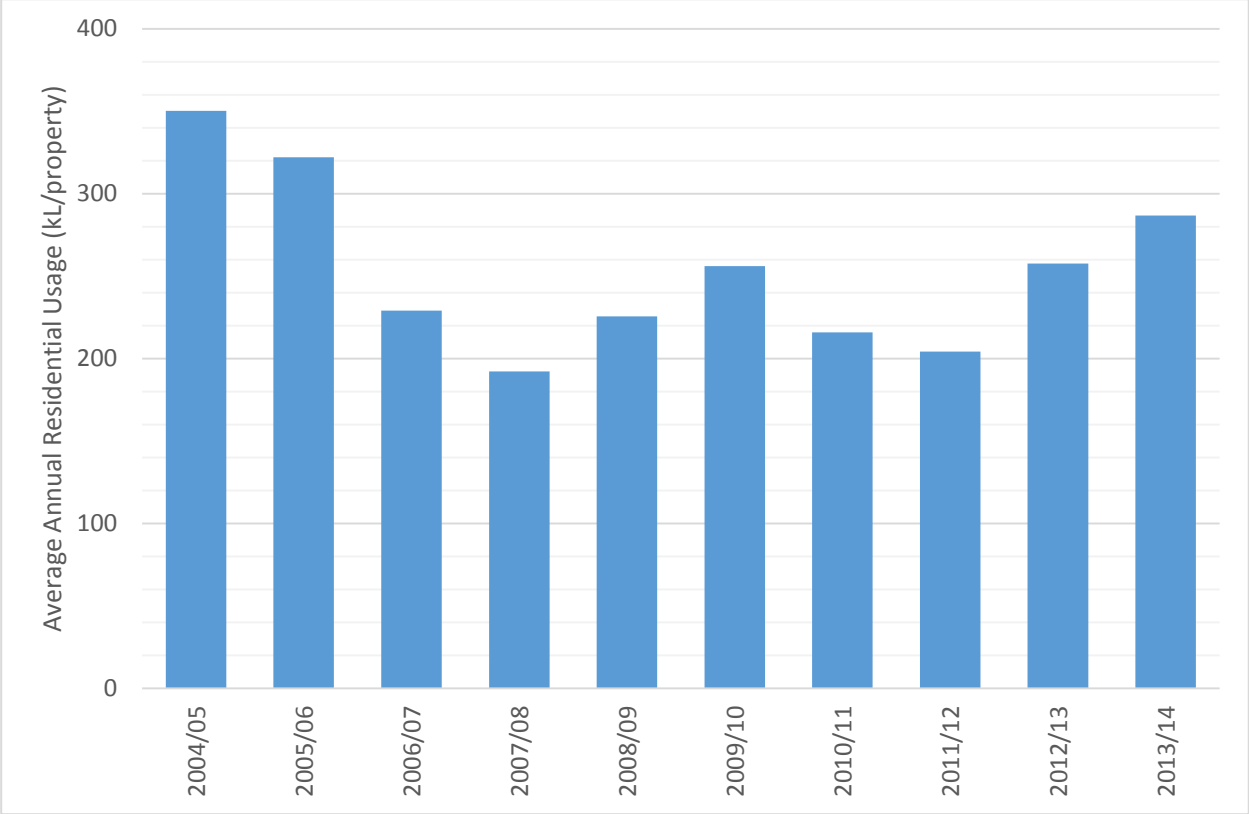

Figure 2.2 Average Annual Residential Usage per Property – Tamworth Regional Council (10 years)

Prevailing climatic conditions, particularly maximum temperatures and rainfall during summer months, have a significant impact on water consumption – particularly residential outdoor water usage. However, the two figures above also show that during the severe drought conditions that were experienced in 2005/06 and 2006/07, water restrictions have a major impact on consumption – particularly in 2006/07 when severe water restrictions, including a ban on outdoor watering, were applied. Immediately following the severe drought period and after the lifting of all water restrictions, residential consumption levels remained low and have only started increasing again over the last two years. Preliminary water consumption data for 2014/15 suggests that residential water demands have now stabilised around 300 kL/a/property; however, drought conditions have returned to the region and low to moderate water restrictions were in place for much of 2014/15.

3 How Water is Currently Used

3.1 Demand Categories

The breakdown of water consumption by major demand type for the combined water supply systems is shown on the figure below. While the majority of water is consumed for residential purposes, non-residential consumption accounts for over one third of water usage, with non-potable and losses accounting for around 6%.

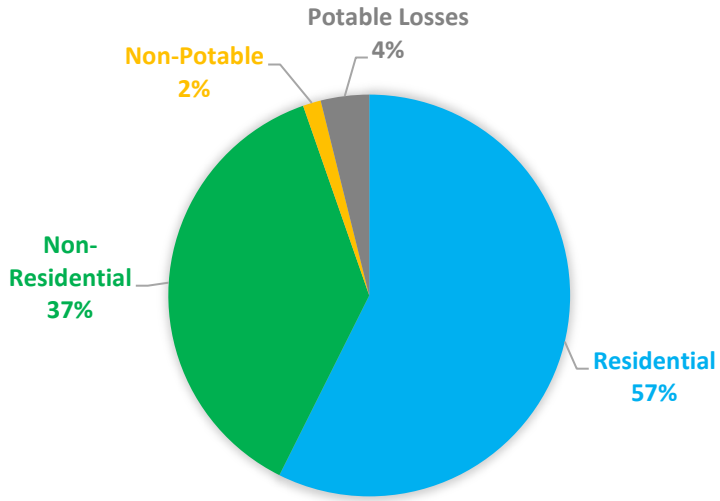

Figure 3.1 Tamworth Combined Systems – Consumption by Major Demand Type (2013/14)

An analysis of metered water consumption by demand category was undertaken for the Tamworth water supply system and is included below on Table 3.1.

It should be noted that some demand categories, such as residential, rural and public parks, may have been influenced by water conservation measures (minor restrictions) that were in force during 2013/14.

Table 3.1 Tamworth Water Supply System – Metered Consumption by Category (2013/14)

Demand Category	2013/14 Consumption (ML/a)	% of Total Consumption	Connections	Consumption per Connection (kL/a/property)
Residential	4,590	58%	16,017	287
Commercial	1,160	15%	1,224	948
Industrial (& food processing)	1,100	14%	86	12,790
Institutions	250	3%	45	5,555
Public Parks	515	7%	214	2,406
Rural (& Dungowan pipeline)	110	1%	140	785
Bulk Sales (& backwash)	155	2%	13	11,923

TOTALS	**7,880**	**100%**	**17,739**	**444**

Residential consumption accounted for just under 60% of metered consumption in 2013/14, with commercial and industrial consumption accounting for just under 30%. Average residential consumption was 287 kL/a/property.

A simplified analysis of metered water consumption by demand category was also undertaken for the remaining small town water supply systems and is included below on Table 3.2.

Table 3.2 Small Town Water Supply Systems – Metered Consumption Summary (2013/14)

System	2013/14 Total Consumption (ML/a)	Proportion Residential	Residential Consumption per Connection (kL/a/dwelling)	Total Consumption per Connection (kL/a/property)
Moonbi / Kootingal	303	68%	259	310
Manilla	296	67%	215	256
Barraba	153	63%	159	205
Nundle	36	45%	121	171
Attunga	41	70%	221	273
Bendemeer	22	73%	134	158

Residential consumption dominates most small town water supply systems, with average residential consumption varying between 121 kL/a/property in Nundle to 259 kL/a/property in Moonbi / Kootingal, which is less than the average residential consumption experienced in Tamworth (287 kL/a/property).

3.2 Benchmarking of Residential Consumption

Benchmarking of residential consumption was undertaken using performance data from 2013/14 from across the state (NOW, 2015) as shown on Figure 3.2 below.

TRC's estimated average residential consumption for 2013/14 was 287 kL/a/property, based on NOW performance reporting. This compares favourably with a sample of other inland Councils, as shown below in Figure 3.2, but is around 65% higher than the state average of 173 kL/a/property. This is due to the relatively dry climate conditions experienced in the Tamworth Region and the resulting increase in irrigation requirements and high use of evaporative coolers. The weighted median of inland Councils (263 kL/a) is considered to be a more realistic benchmark for TRC. TRC was less than 10% higher than this 'Inland Council' benchmark.

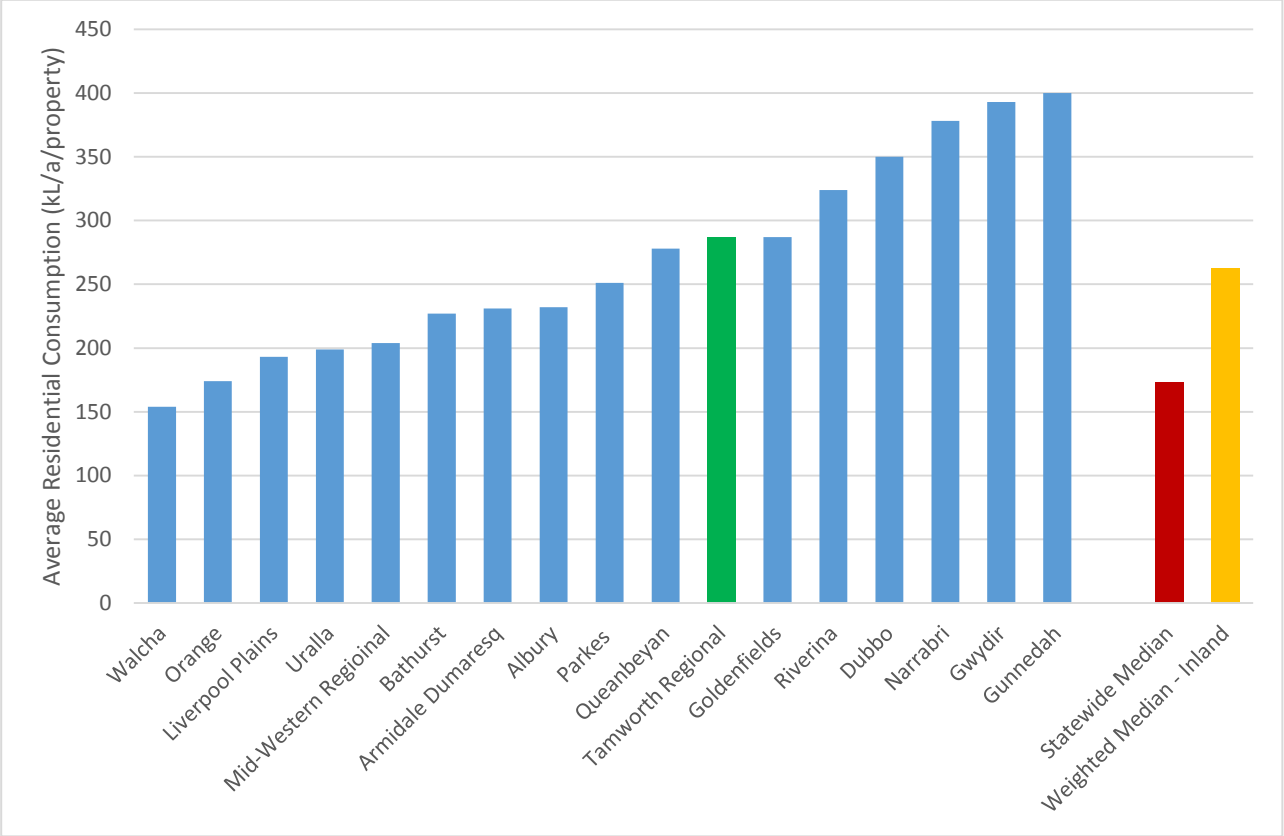

Figure 3.2 2013/14 Benchmarking Data for Residential Consumption (NOW, 2015)

3.3 Residential End-Use

In the absence of local residential end-use metering data to provide an accurate estimate of end-use consumptions, typical values have been adopted based on recent end-use studies conducted across Australia. These studies have typically been undertaken by large metropolitan water utilities that were coastal based. However, while external water usage and evaporative coolers usage can differ substantially across Australia, particularly when comparing coastal areas to inland areas, the breakdown of internal usage is generally relatively consistent across water utilities.

The key assumptions used in developing the residential end-use breakdown were:

- Total household usage was assumed to be 300 kL/a
- Internal household usage (excluding evaporating coolers) was assumed to be 150 kL/a (ie 50% of total consumption)
- Internal consumption breakdown was based on typical values from recent end-use studies across Australia
- Evaporative cooler usage was estimated to be around 30 kL/a per household, which equates to around 1,500 hr operation time per annum (assuming average consumption of 20 L/hr)
- Outdoor water usage (primarily irrigation) was assumed to be the remainder of water usage after accounting for internal usage and evaporative cooler usage.

Figure 3.3 below shows the assumed breakdown of residential end-use that has been adopted for the purposes of assessing demand management options.

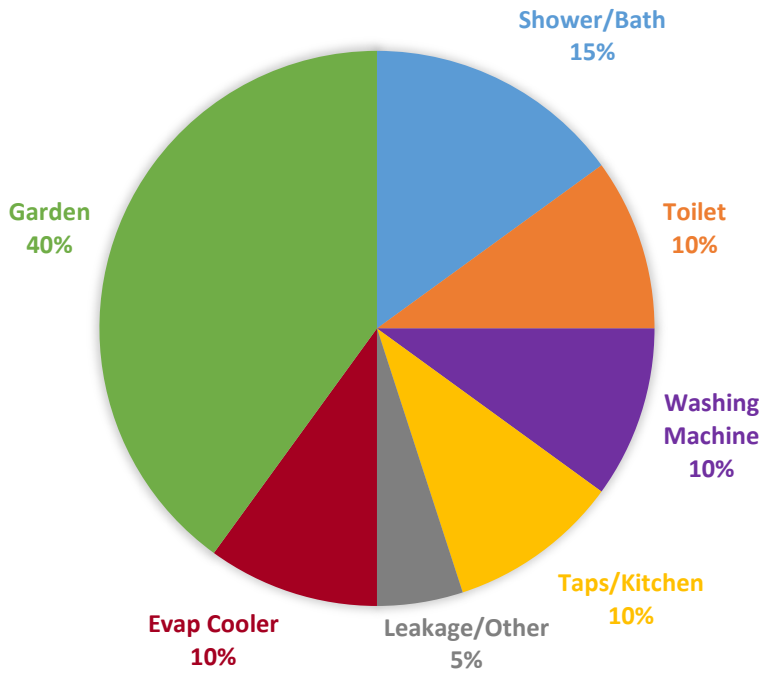

Figure 3.3 End-Use for Residential Properties based on 300 kL/a per household (Estimate Only)

3.4 Water Losses / Non-Revenue Water (NRW)

For the NSW Performance Monitoring Reporting (NOW, 2015), DPI Water has adopted the following terms used by the International Water Association (IWA) to define key components of losses from a water supply system:

1. **Physical / real losses**: including leakage and overflows from all parts of the water supply system
2. **Apparent losses**: including metering inaccuracies and unauthorised consumption (theft)
3. **Unbilled authorised consumption**: including water used by the local water utility for operational reasons, water used for firefighting and water supplied free of charge

Water losses are generally defined as physical / real losses plus apparent losses, while non-revenue water (NRW) is generally defined as water losses plus unbilled authorised consumption and can be calculated from the difference between water production (metered flow into a water supply system) and metered consumption (metered flow from the water supply system to the end user).

Key water loss indicators included in the 2013/14 NSW Performance Monitoring Benchmark Report (NOW, 2015) are included in the table below.

Table 3.3 Water Loss Indicators – TRC & NSW Performance Monitoring Benchmarks (2013/14)

Water Loss Indicator	Tamworth Regional Council	NSW State-Wide Benchmarks (2013/14)		
		20th percentile	Median (50th percentile)	80th percentile
Real Loss (L/service connection/day)	90	50	70	110
NRW (L/service connection/day)	130	66	101	146
NRW (% of total production)	10%	-	10%	-

The performance report figure of 10% NRW for TRC is an adjusted figure for reporting purposes, with DPI Water adopting a minimum water loss figure of 10% across all systems. However, TRC internal data for 2013/14 suggests that actual losses were closer to 7% – with losses for Tamworth water supply system less than 5% and losses for the smaller water supply systems typically around 20%. Real loss and NRW (both reported in L/service connection/day) were also adjusted and explain why TRC reporting figures are higher than the median benchmark.

Internal water loss data suggests that NRW for Tamworth water supply is below benchmark figures and further reductions in water losses are not likely to be achieved economically. However, further reductions in NRW are achievable for the smaller water supply systems and reductions in NRW will continue to be targeted by TRC over the life of this Plan.

3.5 Current Demand Management Measures

TRC developed the Water Sustainability Strategy 2011-2014 (WSS) as the key coordination document to help achieve a sustainable consumption level for reticulated treated water supplies across the region. The core focus of preparing and adopting a water sustainability strategic plan was to optimise regional water supplies by setting key goals and actions to help achieve sustainable water use.

The approach initiated in the WSS involved identifying and undertaking a variety of projects related to the goals, over the period of the strategy, with in-built review processes. The review enabled lessons learnt and challenges being faced to be addressed within both the strategy period, and/or a subsequent updated strategy period. The strategy period is generally three years.

The strategy has four key interrelated themes that reflect how TRC sees the vision of sustainable water use in the region best being achieved. The themes are: developing an integrated approach; increasing awareness and understanding; implementing water efficiency measures; and carrying out effective review and reporting.

The WSS was developed in association with Council's Demand Management Plan and Drought Management Plan, and obtained its overarching and guiding principles from the Tamworth Regional Council Management Plan 2010 – 2013.

Key Achievements

- Between 2007 and 2013, TRC paid out more than $600,000 in financial assistance for TRC residents to install over 4,600 water optimisation products in and around their home at a projected saving of around 150 ML per annum. This included rebates for rainwater tanks, dual flush toilets, showerheads, pool covers, greywater systems, and 4-star washing machines.
- TRC implemented the Large Water Users Reduction Initiative, which included negotiation and agreement of specific water consumption benchmarks for over 60 businesses.
- In coordination with the TRC corporate website redevelopment, various water education and community awareness information was posted and updated including rebates, water sustainability products, dam levels, and links to the Savewater Alliance web-based resources.
- National Water Week, a national awareness-raising event, has been celebrated each year with residents and schools, including competitions, distribution of 500 educational DVDs, and students in schools conducting a water audit of their own schools.
- 20 roadside signs with interchangeable waterwise messages were placed on main approach roads in Tamworth and the towns and villages.
- TRC's water rates notice was redesigned to include more information, including benchmarking information (comparing previous and average consumption) and water sustainability tips.
- TRC, in partnership with Caroma Dorf and Namoi Catchment Management Authority, implemented a dual-flush toilet exchange program (315 units installed / projected saving of 12ML per annum).
- Regular media releases and web stories were used to promote the water sustainability message through various events.
- More than 10,000 items of merchandise promoting the water sustainability message was distributed across the region, including water bottles, USB wristbands, shopping bags, hats, and cricket bats.

4 Future Water Use

4.1 Tamworth Water Supply

Demand forecasts have been estimated based on assumed future residential usage and growth figures and associated non-residential growth (see **Appendix B** for more details). Three demand scenarios have been determined – low, average and high.

The average demand scenario has assumed an annual residential usage of 300 kL/property, which is slightly higher than recent residential usage levels but it considered to be a more realistic and sustainable level over the medium to long term. The lower bound demand scenario adopted 250 kL/property, based on recent residential usage levels being maintained indefinitely, while the higher bound demand scenario adopted 350 kL/property, based on pre-drought demand levels.

In addition to the three residential usage scenarios, three dwellings growth rates have been adopted. The average growth was assumed to be 1.0% pa. A lower bound growth rate of 0.75% pa and a higher bound growth rate of 1.25% pa were also adopted.

The projected bulk water demands shown on the table below are based on the residential usage and growth assumptions discussed above and also include allowance for residential expansion (including Moonbi/Kootingal, Attunga plus others), industrial expansion (doubling of current industrial usage), growth of commercial and institutional demands in line with residential growth and water loses of 10% (see **Appendix B**).

Table 4.1 Projected Bulk Water Demands – Tamworth Water Supply (30 years)

Demand Scenario	Annual Demand for Bulk Water (ML/a)			
	2015 (Existing)	2025 (+10yr)	2035 (+20yr)	2045 (+30yr)
Low (250 kL/a, 0.75%pa)	8,800	9,800	10,900	12,000
Average (300 kL/a, 1% pa)	9,700	11,200	12,800	14,500
High (350 kLa/, 1.25% pa)	10,600	12,700	14,900	17,200

4.2 Other Systems

Minimal growth in water consumption is expected in the majority of the other systems due to minimal population growth expectations for the towns and villages outside of Tamworth. However, future growth in water consumption is expected to occur in Moonbi / Kootingal due to ongoing residential growth in the area. For planning purposes, future water consumption estimates for Moonbi / Kootingal have been included in the demand projections for Tamworth (see Section 4.1).

5 Demand Management Program

The following Demand Management Program (DMP) has been adopted by Council over the next 3 years.

Demand Management Measure	Details / Timing	Customers Targeted	Estimated Council Program Cost* ($ pa)
Community Awareness Program / Pricing	• Continuation and ongoing develop of Community Awareness Program, including: 1. Media advertising campaign 2. Water efficiency resources 3. Education stands at shopping centres and shows / events 4. School Education Program, including resource kits 5. Customer water accounts to include comparisons to benchmark usage & water efficiency tips. 6. Evaporative cooler water efficiency education (pilot program) • Maintain strong water conservation signals through the continued use of tiered water usage pricing	All	**$50K**
Residential Rebates	Up to 50% rebate offered on: 1. 3 Star Showerheads (up to $20) 2. 3 Star Dual Flush Toilets (up to $150) 3. Swimming Pool Covers (up to $100) 4. Rainwater Tanks (or combination of interconnected tanks) connected to garden and toilet and/ or laundry: ➢ Up to $250 for tanks of 2kL to less than 5kL ➢ Up to $500 for tanks of 5kL or more	Existing Residential	**$80K**
Non-Residential Large User Audits & Savings	• Large User Water Savings Action Plans, up to 50% subsidy or maximum of $3,000 per site • Council Water Savings Action Plan – Stage 2 Implementation	Non-residential large water users	**$30K**

Demand Management Measure	Details / Timing	Customers Targeted	Estimated Council Program Cost* ($ pa)
Permanent Water Conservation Measures	The following PWCM will continue to be publicised as an integral part of the Community Awareness Program: • Use of sprinklers, sprays, microsprays and fixed hoses is not allowed during the heat of the day • Trigger nozzles must be used on all hoses to help conserve water & avoid waste • No washdown of hard surfaces unless using a high-pressure cleaner or water efficient nozzle	All	*(Costs included in Community Awareness Program)*
Regulation & Planning Controls	The following regulation and planning controls will contribute to water savings over the life of the Program: • BASIX • WELS Rating Scheme • Smart Approved WaterMark Program	New Residential + New Fittings / Appliances	*(Costs included in Community Awareness Program)*
Water Loss Management	Water Loss Management Program, which includes: • Metering of all properties / connections • Meter replacement program • Annual water loss assessment • Periodic inspection of key assets for leaks	All water supply systems	*(Costs already included in Water Operations Budget)*
Water Recycling & Potable Substitution	Water recycling and other potable substitution initiatives have previously been implemented or will be implemented over the life of the Program and will further contribute to drinking water savings, including: • Use of recycled backwash plus rainwater at AELEC and nearby sports grounds • Installation of groundwater bores at various parks, reserves and playing fields to replace the use of drinking water for irrigation • Use of recycled effluent onsite at Westdale WWTP		

*Note: * Estimated Council Program Cost includes the additional funding that Council will need to budget for over and above its normal water operating expenses. Costs associated with the funding of a full-time Water Sustainability Officer and water loss management costs are considered normal operating expenses and have not been included in the above table. More details on total estimated Council costs and water savings are included in Appendix C.*

5.1 Current Initiatives

Community Awareness Program / Pricing

A Community Awareness Program has been in place since 2007 and will continue to be an integral component of the Demand Management Program. The awareness program is multi-faceted and includes media advertising / promotion, marketing / publicity, publications, internet resources and community and school education. The awareness program will continue to be reviewed and updated to make sure it is relevant and consistent with the other demand management measures and also consistent with Demand Management Programs that have been developed and implemented by other Namoi Water Alliance member councils.

The Community Awareness Program includes:

1. A media advertising campaign that focuses on water efficiency around the home, including both indoor and outdoor usage. Specific attention will be given to awareness and education on the water consumption associated with evaporative cooling systems.
2. Avenues for the community to access resources on water efficiency, including brochures / publications and internet sites. TRC was previously a member of savewater! Alliance (which has recently ceased operating) and is now a member of the Water & Energy Group.
3. Setting up of education stands periodically in shopping centres and at major local shows and events, including during National Water Week.
4. A School Education Program, including a water efficiency resource kit to encourage schools to integrate water conservation into their curriculum and reduce water consumption throughout the school.
5. Customer water accounts that include water efficiency tips and provide information on customer's water usage relative to water efficient benchmarks, based on household / business size.

In order to administer the Community Awareness Program and many of the other demand management measures, TRC will need to continue to employ a Water Sustainability Officer. This employee is primarily responsible for water education in the community and general administration of the Demand Management Program. It may also be possible for Council to utilise resources including the local TAFE College and other vocational training organisations to assist in the development and implementation of marketing and educational programs.

While the initial implementation of a comprehensive Community Awareness Program should see water savings equivalent to a 5 – 10% reduction in residential usage, once the program has been implemented, the continuation and ongoing development of the program is needed to maintain the savings associated with the reduction in residential usage. A relaxation of the Community Awareness Program is likely to result in a gradual increase in residential usage over time, as inefficient water habits are once again adopted.

A strong water conservation signal will also be maintained through the continued use of tiered water usage pricing.

Residential Rebates

A residential rebate scheme for the purchase of a variety of water efficient products has been in place since 2007 and will continue as a financial incentive for residential customers to become more water efficient. The rebate scheme complements the federal government's Water Efficiency Labelling Scheme (WELS) and the NSW government's BASIX planning controls, by targeting older residential properties with inefficient fixtures. Rebates of 50% of purchase cost of the product, up to a certain limit, are generally offered. As the rebates are funded from Council's water budget, only customers connected to the reticulated water supply systems are eligible.

It is anticipated that the number and types of rebates offered may change over time. The current Residential Rebate Scheme will run to February 2017 before being reviewed and potentially extended. Prior to extending the program by up to an additional three years, TRC will review which rebates to offer, what conditions apply (including whether to increase the star ratings from three to four stars) and how much will be offered for each rebate. The current residential rebates that are offered by council are:

- 3 Star (WELS rated) Showerhead Rebate (up to $20): The estimated water savings for each showerhead is around 15kL/a, with additional energy saving benefits from reduced hot water usage.
- 3 Star (WEL rated) Dual Flush Toilet Rebate (up to $150): The estimated water savings for a water efficient dual flush toilet is around 45kL/a.
- Swimming Pool Covers (up to $100): Pool covers must be endorsed under the Smart Approved Watermark Scheme. The estimated water savings for a pool cover is around 45 kL/a.
- Rainwater Tank Rebate (up to $250 for a tank between 2kL and less than 5kL and up to $500 for a tank of 5kL or more): Rainwater tanks must be connected to both an external garden watering tap and at least one internal application, such as a toilet or washing machine and can be a combination of interconnected tanks. The estimated savings are around 60kL/a for a 5kL rainwater tank.

Rebates are generally limited to one rebate of each type per property and are available to both existing and new dwellings, as long as the water efficient product are not required to be installed as part of the conditions of development (including BASIX requirements).

The rebate scheme is also integrated into the Community Awareness Program.

Non-Residential Large User Audits & Savings

The non-residential audit program has been very successful in reducing the consumption of large users over the past five years and will continue, with a focus on:

- Existing or new large users not previously subject to a water savings audit
- Revisiting key industries that have previously implemented water savings actions and confirming achieved water savings
- Stage 2 of Council's Water Savings Action Plan – implementation of key actions to achieve target water savings

The purpose of a Water Savings Action Plan is to identify and help deliver cost effective water savings in a practical, effective and flexible way. The initial audit and subsequent preparation of the Water Savings Actions Plan would be undertaken by the non-residential customer in association with the nominated TRC employee responsible for water education.

The scheme is subject to a nominal 50/50 cost sharing arrangement, with Council funding up to 50% of the cost of the audit (up to a maximum of $3,000 per site) and the customer funding the remainder.

As one of the region's largest users, Council will review and update its previous Water Savings Action Plan based on its own operations, with a major focus on implementing a range of water savings initiatives, particularly in the parks and gardens area. It is important that Council sets the example for water efficiency for the whole community, particularly in high visibility areas such as watering of parks and gardens.

Permanent Water Conservation Measures

Permanent Water Conservation Measures (PWCM) have been adopted as a key component of Council's Demand and Drought Management Plans in order to ensure that common sense water use practices are always adopted and to reinforce other demand management measures by developing a culture of water efficiency. The PWCM rules are easy to understand and follow and are designed not to cause undue hardship on the community.

The four basic rules are:

1. Use of sprinklers, sprays, microsprays and fixed hoses is not allowed during the heat of the day (which means watering must take place between 4pm to 9am Eastern Standard Time and 6pm to 8am Daylight Saving Time)

2. Hand-held hoses with trigger nozzles, and buckets or watering cans, may be used for watering of lawns, gardens and vehicle-washing at any time

3. Trigger nozzles must be used on all hoses to help conserve supplies and avoid waste

4. No washdown of hard surfaces unless using a high-pressure cleaner

Regulation & Planning Controls

Council will continue to actively support and implement various state and national based regulation and planning controls that promote water efficient products, practices and developments. Key regulation and planning controls that will be supported and promoted by the Community Awareness Program include:

- **BASIX**: The NSW Government has implemented residential building planning controls that require all new homes to be water and energy efficient. New homes are generally required to install water efficient fittings, have indigenous garden species and install a rainwater tank.

- **WELS Rating Scheme**: The State and Federal Government have implemented the Water Efficient Labelling & Standards (WELS) rating scheme which applies national mandatory water efficiency labelling (up to 6 Stars) and minimum performance standards to household water-using products.

- **Smart Approved WaterMark Program**: This program was established by four associations (Australia Water Association, Irrigation Australia, Nursery and Garden Industry and Water Services Association of Australia) as a nationally endorsed, non-compulsory water efficiency labelling scheme for products and services which primarily help reduce outdoor water use.

Water Loss Management

Physical / real losses are generally the largest component of water losses. They are primarily an operation and maintenance issue and are therefore generally the losses that are targeted in a demand management program. Water losses are best managed by way of a Water Loss Management Program (which often is a component of a more comprehensive Asset Management Program).

The Water Loss Management Program will focus on the following areas:

- Metering of all properties and connections, including all public facilities, parks and gardens, standpipes and Council's water and sewer facilities (eg pumping stations).
- A residential Water Meter Replacement Program – residential water meters are typically replaced once they have read over 4,500 kL or prior to this if they are shown to be faulty.
- Preparation of an annual Water Loss Management Progress Report, which includes an assessment and breakdown of annual water loss for each water supply system based on the preceding 12 months of metering data.
- Where the annual water loss audit has shown an increase in physical / real losses, inspections of key assets for the detection and repair of system leaks will occur, including inspection of water reservoirs, water pumping stations, major water system control valves and Council swimming pools.

Pressure management has previously been considered but was dismissed as a viable option to effectively reduce water losses in the Tamworth water supply system. The potential benefits of pressure management in Tamworth should be revisited once pressure management programs have been implemented and proven elsewhere.

Water Recycling & Potable Substitution

The following water recycling and potable substitution initiatives have previously been implemented or will be implemented over the life of the Program and will further contribute to potable water savings. Water recycling and potable substitution initiatives include:

- Use of recycled backwash from Calala WTP and rainwater from roof runoff for irrigation at the Australian Equine and Livestock Events Centre (AELEC) and nearby sporting venues
- Installation of groundwater bores at various parks, reserves and playing fields
- Use of recycled effluent at Westdale Wastewater Treatment Plant for on-site wash down & grounds maintenance
- A range of investigations undertaken by Council staff in 2015 on parks and gardens irrigation in Tamworth have identified actions that will result in significant potable water savings through a combination of more efficiency irrigation practices and potable substitution with groundwater
- The installation of a new bore at Tamworth Regional Botanic Garden will reduce the use of potable water for irrigation
- Mature-age trees at Council's nursery site at Tamworth Region Botanic Garden will be relocated to a site at the Westdale Wastewater Treatment Plant and be irrigated using recycled effluent
- Effluent reuse opportunities will also be considered in association with investigations into ongoing effluent disposal and quality issues associated with the small town wastewater treatment plants

- Lot scale water recycling opportunities such as rainwater tanks and greywater reuse are covered by BASIX for new developments and/or the residential rebate scheme

5.2 Pilot Programs

The following pilot programs will be investigated by TRC in association with the Demand Management Program and the programs will be subject to trial and review before implementation:

- **Non-Residential Water Savings Grants Program**: Council will investigate the implementation of a non-residential water savings program with a funding, monitoring and milestones model similar to the EPA's Organics Infrastructure Program (http://www.epa.nsw.gov.au/wastegrants/organic-large-small.htm). The program would see non-residential users submitting an application for the funding and Council assessing the applications and awarding grants based on various program objectives, such as cost effectiveness, innovation and community benefit.
- **Evaporative Cooler Water Efficiency Program**: A water efficiency program for evaporative coolers could include a community awareness and education campaign, the distribution of education material, consideration of rebates for installing new water efficient coolers and audits/modifications to improve the efficiency of existing units. The program could also include baseline monitoring of a range of existing evaporative cooling systems and follow up monitoring following the modification or replacement of existing units. To assist with the baseline monitoring, a household end-use assessment may also be considered, potentially in association with a university research project.

5.3 Future Initiatives

A list of potential future demand management initiatives that could be considered in the future (potentially in 5 – 6 years' time when the Demand Management Program is reviewed and updated) is included below:

- A sustainable garden demonstration project
- A sustainable house and garden demonstration project
- Stormwater recycling
- Expansion of Westdale Effluent Reuse Scheme to include non-potable substitution (eg parks and gardens and non-residential reuse)

6 Implementation & Monitoring

This Demand Management Plan outlines the various demand management measures that have been adopted by TRC and will be employed to encourage water efficiency across the water supply systems that are operated by Council. The development of implementation plans and ongoing monitoring of the individual programs are critical to the success of the Demand Management Plan.

Any new demand management measures will require an implementation plan to be developed and documented by Council to ensure the successful setup and delivery of the specific program. The implementation plan would cover the following key areas:

1. Program objectives and duration
2. Identify key people responsible for implementing the program
3. Identify any specific training needs
4. Develop more detailed budgets, including identifying other resourcing requirements (need to develop annual budgets for the life of the program)
5. Develop a communication strategy (in associated with Community Awareness Program)
6. Scheduling and specific requirements for monitoring and evaluation

Where pilot programs have been proposed, the implementation plan would also cover the implementation of the pilot program, including the scope and expected length of the pilot program and how the full program will be rolled out once the pilot program has been completed. Depending on the outcomes of the pilot program, the implementation plan may need to be revised before rolling out the full program.

For demand management measures that have been previously implemented by Council, these measure are unlikely to need a specific implementation plan unless the nature of the program has changed significantly or other issues such as additional training or monitoring have been identified.

Regular monitoring, evaluation and review will be required for each individual program, as well as the overall Demand Management Program. Monitoring and evaluation of individual programs should include consideration of key outcomes (eg water savings, participation rates, customer satisfaction) and key processes (eg ease of implementation, Council costs / resources to run program). Monitoring and evaluation of the full Demand Management Program should also be undertaken to assess effectiveness of the combined programs and how they relate to each other.

Annual progress reports on the Demand Management Program will be prepared in association with a progress report on Water Loss Management. The progress report will include the outcomes of regular monitoring and an evaluation of the ongoing effectiveness of the programs. Where necessary, adjustments and/or enhancements should be made to the program based on the annual progress reports.

Three year Water Sustainability Strategies will continue to be prepared by Council's Water Sustainability Officer (now a part of the recently formed Sustainability Team) and will include more detailed goals and actions associated with implementing and monitoring the Demand Management Program.

The Demand Management Plan should be reviewed and updated at least every 5 – 6 years.

7 References

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ISF. (2008). *Guide to Demand Management.* WSAA: Institute for Sustainable Futures.

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Appendix A
Location & Climate

Location & Climate

TRC serves a population of just over 60,000 and covers an area of 9,893 km2 stretching from the Nandewar Range north of Barraba, south-east to the Peel and Great Dividing Ranges. In addition to the towns and villages that have reticulated water supply systems there are several other villages located within the local government area that do not have formal water supply systems, including Dungowan, Woolomin, Duri, Somerton and Woolbrook. The nearest cities/towns outside of TRC are Armidale (which is located around 115km to the northeast of Tamworth) and Gunnedah (which is located around 80km to the west).

The Tamworth Region experiences a dry sub–humid climate. Temperatures are warm to hot in summer with relatively low humidity, mild in autumn and spring and cool to mild in winter. Rainfall is generally lower over the autumn and winter months and highest in summer months due to a predominance of summer storms.

Median rainfall in Tamworth city is 634 mm per annum, however higher rainfall is experienced in more elevated areas (>800mm pa in Nundle and Bendemeer). Average annual evaporation is 1971 mm per annum, and average 3pm relative humidity is 42%. Monthly climate statistics for Tamworth are included on the table below.

Table A1 Climate Statistics – Tamworth Airport (1992 – 2015)

Climate Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	58.6	77.2	48.6	27.1	27.1	48.6	44.5	38.1	43.9	53.0	87.6	79.4	634
10%ile Rainfall (mm)	13.2	21.3	9.8	0.4	0.9	13.7	7.4	4.2	10.8	13.0	36.8	40.9	463
Mean Evap. (mm)	267	227	214	138	90	60	65	93	132	186	228	270	1971
Mean Max. Temp (^{o}C)	32.6	31.3	29.1	25.3	20.7	17.0	16.3	18.4	21.9	25.4	28.3	30.2	24.7

It is widely accepted that future climate changes could impact water supply systems through changing frequency and duration of rainfall, as well as an increase in evaporation. While estimating the impacts associated with future climate change is very difficult and is an evolving science, recent studies have started to provide some indication of the potential climate impacts. However, modelling to-date has focused more on changes in average monthly or annual statistics and less on the duration and frequency of extreme events, which is more critical for drought management.

A summary of the estimated impacts of future climate change on maximum temperatures, rainfall and evaporation for the New England / North West region is shown on Table A2 below.

Table A2 Max Temp, Rainfall & Evap Predictions for New England / North West Region at 2050

Season	Maximum Temperatures	Rainfall	Evaporation
Spring	2 – 3°C warmer	5 – 10% increase	10 – 20% increase
Summer	1 – 1.5°C warmer	10 – 20% increase	10 – 20% increase
Autumn	1.5 – 2 °C warmer	5 – 10% increase	10 – 20% increase
Winter	2 – 3 °C warmer	10 – 20% decrease	5 – 10% increase

Source: *NSW Climate Impact Profile* (DECCW, 2010)

In general, temperatures are virtually certain to rise, rainfall is likely to increase in all seasons except winter and increased evaporation is likely in all seasons. The NSW Climate Impact Profile report (DECCW, 2010) also states that the impact of the El Nino Southern Oscillation (ENSO) is likely to become more extreme – with ENSO years continuing to be drier than average, but also becoming hotter, leading to more extreme impacts.

Appendix B
Demand Projections

Appendix B – Demand Projections

DEMAND PROJECTIONS ML/a LOW SCENARIO		Residential Dwelling Growth Residential Consumption	0.75% pa 250 kL pa				
DEMAND COMPONENT	**Growth Rate (% pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Residential	0.75%	4,080	4,390	4,730	5,100	5,490	5,920
Commercial	0.75%	900	970	1,050	1,130	1,220	1,310
Industrial (incl. Food Processing)	0%	1,650	1,650	1,650	1,650	1,650	1,650
Public Parks	0%	450	450	450	450	450	450
Institutions	0.75%	300	320	340	370	400	430
Other	0.75%	200	220	240	260	280	300
Residential Expansion	NA	350	500	650	800	950	1,100
Industrial Expansion	NA	-	330	670	1,000	1,330	1,670
Losses (incl. backwash users) 10%	NA	880	980	1,090	1,200	1,310	1,430
TOTAL		**8,810**	**9,810**	**10,870**	**11,960**	**13,080**	**14,260**

DEMAND PROJECTIONS ML/a AVERAGE SCENARIO		Residential Dwelling Growth Residential Consumption	1.00% pa 300 kL pa				
DEMAND COMPONENT	**Growth Rate (% pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Residential	1.00%	4,890	5,400	5,970	6,590	7,280	8,040
Commercial	1.00%	900	990	1,090	1,200	1,330	1,470
Industrial (incl. Food Processing)	0%	1,650	1,650	1,650	1,650	1,650	1,650
Public Parks	0%	450	450	450	450	450	450
Institutions	1.00%	300	330	360	400	440	490
Other	1.00%	200	220	240	270	300	330
Residential Expansion	NA	350	550	750	950	1,150	1,350
Industrial Expansion	NA	-	500	1,000	1,500	2,000	2,500
Losses (incl. backwash users) 10%	NA	970	1,120	1,280	1,450	1,620	1,810
TOTAL		**9,710**	**11,210**	**12,790**	**14,460**	**16,220**	**18,090**

DEMAND PROJECTIONS ML/a HIGH SCENARIO		Residential Dwelling Growth Residential Consumption	1.25% pa 350 kL pa				
DEMAND COMPONENT	**Growth Rate (% pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Residential	1.25%	5,710	6,460	7,310	8,280	9,380	10,620
Commercial	1.25%	900	1,020	1,150	1,300	1,470	1,660
Industrial (incl. Food Processing)	0%	1,650	1,650	1,650	1,650	1,650	1,650
Public Parks	0%	450	450	450	450	450	450
Institutions	1.25%	300	340	380	430	490	550
Other	1.25%	200	230	260	290	330	370
Residential Expansion	NA	350	600	850	1,100	1,350	1,600
Industrial Expansion	NA	-	670	1,330	2,000	2,670	3,330
Losses (incl. backwash users) 10%	NA	1,060	1,270	1,490	1,720	1,980	2,250
TOTAL		**10,620**	**12,690**	**14,870**	**17,220**	**19,770**	**22,480**

DWELLING PROJECTIONS	**Growth Rate (%pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Low	0.75%	16,300	17,565	18,927	20,396	21,978	23,683
Average	1.00%	16,300	18,005	19,889	21,970	24,268	26,807
High	1.25%	16,300	18,456	20,897	23,661	26,791	30,335

Appendix C
Estimated Costs & Water Savings

Appendix C – Estimated Costs & Water Savings

Table C1 Council Costs & Water Savings Associated with Demand Management Program (over 3 years)

Demand Management Measure	Assumptions (Costs & Benefits)	Estimated Total Council Costs (over 3 years)	Estimated Total Water Savings (over 3 years)
Community Awareness Program / Pricing	• Costs include funding Water Sustainability Officer position plus marketing costs (pamphlets, advertising, handouts, etc) • Benefits assumed to be 5% reduction in residential usage in the years the community awareness program is operating (225 ML/a)	$450K	675 ML
Residential Rebates	• Costs include amount paid out in residential rebates ($80K pa) • Benefits are based on the estimated number of rebates times the estimated benefit for each rebate type (compounds each year)	$240K	120 ML
Non-Residential Large User Audits & Savings	• Costs include an allowance for an additional 10 audits pa ($3K each) plus an allowance of $50K pa for Stage 2 of Council's Water Savings Action Plan • Benefits are based on an assumed 5% reduction in the consumption of the target user group by year 3 (ie 5% of 1,000ML)	$240K	105 ML
Permanent Water Conservation Measures	• Costs and benefits have been included in the Community Awareness Program	*(Costs included in Community Awareness Program)*	*(Savings assessed in Community Awareness Program)*
Regulation & Planning Controls	• No direct costs to Council • Benefits are based on around 200 new houses pa and a reduction in water consumption of 35% compared to the average house in Tamworth	0	120 ML
Water Loss Management	• Costs include an annual allowance to manage and improve water loss in small towns ($50K pa) • Benefits are based on an assumed 5% reduction in water losses in small towns (ie reduce from around 20% to 15%) by year 3 (ie 5% of 800 ML)	$150K	90 ML
TOTALS (over 3 years)		**$1,080K**	**1,110 ML**

Assuming total savings of 1,110 ML over 3 years and direct program costs of $1,080K, the unit cost of the program to TRC is around $0.97/kL (based on a simplified analysis). This compares favourably with the current water usage charge of $1.45/kL (tier 1, 2015/16) and if the current water usage charge is assumed to be indicative of the 'value' of water (ie the marginal cost), then the benefit-cost ratio of the program is around 1.5. However, additional upfront and ongoing costs to the community, businesses and government have not been considered and additional benefits, including the deferral of capital works, reduced energy costs and reduced costs for wastewater treatment have also not been considered.