Rous County Council

Future Water Strategy

Coarse Screening Assessment of Options

Final Report

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20-017 ROUS FUTURE WATER STRATEGY
COARSE SCREENING OF OPTIONS

REV	DESCRIPTION	AUTHORS	REVIEW	APPROVAL	DATE
0	Draft for RCC review	R. Campbell	M. Howland	M. Howland	4 Feb 2020
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2	Minor edits	R. Campbell		R. Campbell	6 March 2020

EXECUTIVE SUMMARY

Rous County Council has identified an expected future shortfall in water supplies for the regional bulk supply system from 2024 and a supply deficit of 6,500 ML/a in 2060.

This report documents the outcomes of the coarse screening assessment of source augmentation options undertaken as part of the review of the Rous County Council Future Water Strategy. The coarse screening assessment undertaken for the Future Water Strategy adopted in 2014 has been reviewed and updated where new information is available.

The outcomes of the coarse screening assessment are given in Table 1.

The following options passed the coarse assessment and will be considered further as part of the revised Future Water Strategy:

- Staged Dunoon Dam (20 GL – 50 GL).
- Connection to Marom Creek water treatment plant (upgraded) with raising of Marom Creek Weir and local groundwater supplies.
- Groundwater harvesting – Woodburn, Tyagarah, Newrybar and Alstonville.
- Desalination.
- Indirect potable reuse (treated wastewater from constituent council wastewater treatment plants transferred to Rous County Council surface water supplies).

Detailed investigations will be undertaken by Rous County Council and the constituent councils to further develop these options. In addition, WaterNSW is currently undertaking modelling to confirm the available capacity for allocation of additional extraction licences as part of the 20 year infrastructure options study for Toonumbar Dam and the NSW Government may consider options involving increased use of Toonumbar Dam for town water supply. Options involving use of water from Toonumbar Dam (with raising of the dam) in the RCC bulk supply network may be considered by Rous County Council if the results of the investigations are made available prior to June 2020.

The following options were not considered in detail in the development of the 2014 Future Water Strategy (due to low yield benefit and/or other risks). The findings of the original Integrated Water Planning process are still considered valid and these options will not be considered further in the development of the revised Future Water Strategy:

- Raise Rocky Creek Dam.
- Raise Emigrant Creek Dam.
- Purchasing or trading existing water entitlements from Toonumbar Dam.
- Regional interconnection with Casino water supply (Jabour Weir).
- Managed aquifer recharge with treated wastewater effluent.
- Direct potable reuse.
- Stormwater reuse.

The following new options have been considered but did not pass the coarse assessment and will not be considered further in the development of the revised Future Water Strategy:

- Pipeline from existing Toonumbar Dam or Eden Creek to Casino or Rocky Creek Dam.
- Regional interconnection with the Tweed Shire Bray Park system.

The “do nothing” option (reliance on existing surface water sources) will not form part of the long-term strategy but will be used to compare the benefits and costs of supply scenarios.

The Regional Demand Management Plan includes actions relating to wastewater reuse (urban dual reticulation), water loss management and other demand management measures. The updated demand forecast being undertaken for the development of the revised Future Water Strategy will consider the potential for reduction in demand resulting from the implementation of these measures. Increased drought restrictions will not be included as a long-term strategy as feasible supply options are available to ensure security of supply.

Table 1: Coarse assessment outcomes – supply options

No.	Option	Description	Conclusion	Result
1 - Do nothing – status quo				
1	River/creek raw water extraction (current system)	Existing RCC supply – Rocky Creek Dam, Emigrant Creek Dam and Wilsons River Source.	Existing sources will not meet future demand.	Fail
2- Existing source augmentation				
2a	Raise Rocky Creek Dam	Raising the existing dam by up to 8 metres to a height of up to 36 metres and increasing the storage capacity from 14,000 ML to 35,000 ML. Because of the need to provide environmental flows, this would only increase the yield of the dam by about 1,200 ML/a.	High capital cost and environmental impact for low future yield.	Fail
2b	Raise Emigrant Creek Dam	Raise the existing dam.	Site geology significantly limits the height to which the dam could be raised, and the relatively small catchment area results in only a very small increase in yield.	Fail

No.	Option	Description	Conclusion	Result
3 - Toonumbar Dam				
3a	Purchasing or trading existing water entitlements from Toonumbar Dam	Accessing existing low security water entitlements within the Toonumbar regulated water source. Water would be transferred to the Casino WTP for treatment to potable standards and then pumped into the RCC supply.	RCC may be able to buy existing licences, but these would not provide the level of security required.	Fail
3b		New town water supply licence within the Toonumbar regulated water source under existing Water Sharing Plan. Water would be transferred to the Casino WTP for treatment to potable standards and then pumped into the RCC supply.	Town water supply licences are not permitted under the existing Water Sharing Plan. High security water available from Toonumbar Dam is not sufficient to meet supply deficit (estimated 300 ML/a).	Fail
3c	Pipeline from Toonumbar Dam or Eden Creek to Casino or Rocky Creek Dam	Water Sharing Plan modified to allow town water supply licences.	High security water available from Toonumbar Dam is not sufficient to meet supply deficit (estimated 300 ML/a).	Fail
3d	Raising Toonumbar Dam	10 m or 20 m raising has previously been considered. Water would be transferred to the Casino water treatment plant and then pumped into the RCC supply.	Availability of high security water is unknown.	Pass[1]
4 - Dunoon Dam				
4a	Staged Dunoon Dam (20 GL – 50 GL)	Initial 20 GL storage on Rocky Creek with provision for future raising to 50 GL. Water would be treated at Nightcap water treatment plant.	Provides long-term yield benefit. Environmental and cultural heritage impacts will need to be assessed and potentially offset.	Pass
4b	Toonumbar Dam environmental flows to offset Dunoon Dam release requirements	Operational changes may be considered by the NSW Government.	No details available. Further consideration is recommended as a complementary action with Dunoon Dam.	Pass[1]
5 - Regional interconnection				
5a	Connection to Tweed Shire Bray Park system and Dunoon Dam	Interconnection of the Rous and Bray Park systems with source augmentation (raising Clarrie Hall Dam with Dunoon Dam).	Tweed Shire Council is planning to raise Clarrie Hall Dam as a short-term augmentation option for the Bray Park water supply and therefore does not support this option. This is a long-term (>30 years) option only.	Fail

No.	Option	Description	Conclusion	Result
5b	Connection to Tweed Shire Bray Park system and Toonumbar Dam	Interconnection of the Rous and Bray Park systems with source augmentation (raising Clarrie Hall Dam with Toonumbar Dam).	Tweed Shire Council is planning to raise Clarrie Hall Dam as a short-term augmentation option for the Bray Park water supply and therefore does not support this option.	Fail
5c	Connection to Casino (Jabour Weir)	Interconnection of the Rous supply with the Casino water supply sourced from Jabour Weir.	Has been considered by Richmond Valley Council to augment Casino water supply but provides insufficient yield for Rous bulk supply.	Fail
5d	Connection to Marom Creek water treatment plant	Raising of Marom Creek Weir and reinstatement of aquifer supplies and upgraded WTP to supply Alstonville/Wollongbar with excess to Lismore.	Offers diversification of surface water sources for RCC with expected secure yield of approximately 800 – 1,000 ML/a (NUWS, 2018).	Pass
6 - Groundwater				
6a	Groundwater extraction	Various groundwater supplies have been considered (reinstatement of bores at Woodburn and Alstonville, new borefields at Tyagarah, Newrybar and Alstonville)	Scheme costs are likely to be higher than first thought but localised groundwater supplies can provide a diversified supply to some areas of the bulk supply network. However, the Water Sharing Plan limits new licences in some groundwater sources.	Pass
7 - Stormwater				
7a	Urban stormwater irrigation	Collection and storage of urban stormwater runoff, followed by treatment and irrigation of the treated water onto open space areas.	Due to climate dependence, stormwater reuse does not provide a significant yield benefit.	Fail
7b	Non-potable urban stormwater reuse (dual reticulation)	Dedicated reticulation system to supply treated stormwater for outside use and toilet flushing within new urban development areas.		Fail
7c	Indirect potable urban stormwater reuse	Stormwater collected and transferred to an existing water treatment plant (e.g. Nightcap or Emigrant Creek) for subsequent supply to consumers.		Fail
8 - Desalination				
8a	Desalination	Conversion of saline water to fresh water suitable for potable use. Potentially staged desalination plant capacity.	Climate resilient water source but with significant power requirements and brine management constraints to be addressed.	Pass

No.	Option	Description	Conclusion	Result
9 – Wastewater recycling				
9a	Indirect potable reuse to surface waters	Highly treated reclaimed water supply into Rocky Creek Dam, Emigrant Creek Dam or Wilsons River Source for subsequent extraction, treatment and transfer using existing infrastructure.	Climate resilient water source. Quantity of water available has not been confirmed. NSW government policy has not been developed for planned indirect potable reuse.	Pass
9b	Dual reticulation (urban)	Dedicated reticulation system to deliver treated reclaimed water for outside use and toilet flushing within new urban development areas.	Included in Regional Demand Management Plan (Ballina Shire and Byron Bay).	Pass
9c	Managed aquifer recharge with treated wastewater effluent.	Intentional recharge of an aquifer under controlled conditions, either by injection or infiltration, in order to store a water source for later abstraction and use (indirect reuse), or for environmental benefits.	RCC does not currently utilise groundwater apart from emergency sources. Groundwater options including aquifer recharge may be considered feasible pending outcomes of the current studies. This will be treated as a groundwater supply option (similar to the 2014 FWS) as aquifer recharge is not an augmentation option by itself. Based on recent investigations, groundwater options are expected to be limited by location and water quality rather than quantity and therefore aquifer recharge may not be required.	Fail
9d	Potable reuse	Treating sewage effluent to produce reclaimed water of a quality that would be suitable for drinking purposes. This water would then be provided direct to consumers.	The community/regulators are unlikely to support/approve this option while other options are feasible, even though they may have a greater whole-of-life cost.	Fail

1. It is considered highly likely that the information required to assess these options will not be available until after RCC determines the preferred direction for the Future Water Strategy.

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TABLES

1. INTRODUCTION

Rous County Council (RCC) has identified an expected future shortfall in water supplies for the regional bulk supply system from 2024 and a supply deficit of 6,500 ML/a in 2060.

In 1995, RCC adopted the following long-term water supply strategy after investigation of a range of options and consultation with stakeholders:

1. Implementation of demand management strategies to promote efficient water use among consumers (implemented through the Regional Demand Management Plan).
2. Promotion of alternative water supply initiatives, such as dual reticulation of recycled water in new urban developments (implemented through the Regional Demand Management Plan).
3. Development of the Wilsons River Source, drawing freshwater from the upper limits of the Wilsons River tidal pool, upstream of Lismore (complete).
4. Nomination of the proposed Dunoon Dam, to be developed, if and when required, to maintain water supply security following the implementation of the other options.

Work on the Future Water Strategy (FWS) commenced in 2009 with investigations into new water sources, demand management and water loss reduction actions. The FWS was adopted in 2014 with three key actions – demand management, increased use of groundwater and potentially water re-use. Since then RCC has undertaken extensive investigations into groundwater as an additional source. A review of the FWS is being undertaken to re-assess the available source augmentation options through a coarse options screening process followed by a triple-bottom line (TBL) analysis of potentially viable augmentation options and scenarios.

The source augmentation options to be reviewed include those considered in the 2014 FWS, new options identified since then and potentially other new options identified during the current review of the FWS. Options to be considered in the FWS Review have previously been investigated and documented either as part of previous investigations (raise existing storages, Toonumbar Dam, Tweed supplies, Jabour Weir, urban stormwater) or investigated more recently by RCC and the constituent councils (Marom Creek WTP and groundwater). Detailed investigations are being undertaken separately to the current FWS Review and will supplement the available information to enable detailed assessment of these options.

This report documents the outcomes of the coarse screening assessment of source augmentation options.

2. BACKGROUND INFORMATION

A summary of available information on the options for the RCC bulk supply is provided in the following sections.

2.1 Demand Forecast (2013)

RCC previously developed a long-term water supply demand forecast as part of the development of the 2014 FWS (Hydrosphere Consulting, 2013a).

The demand forecast is being updated as part of the FWS review. Revised FWS scenarios will be developed to address the long-term demand.

2.2 Northern Rivers Regional Bulk Water Supply Study (2013)

In 2013, the Northern Rivers Regional Organisation of Councils (NOROC, now the Northern Region Joint Organisation) developed a long-term (50-year) regional water supply strategy in order to evaluate the

potential benefits to future water supply security resulting from a regionally integrated system. The study (Hydrosphere Consulting, 2013b) investigated numerous interconnection and supply scenarios to identify options that warrant further investigation in future stages of the strategy development. To progress the development of a regional water supply strategy, the study recommended various investigations including:

- Regional investigations that are specific to the regional approach and would require cooperation between the Local Water Utilities (LWUs, RCC; Tweed Shire Council, TSC; Kyogle Council, KC; Ballina Shire Council, BaSC, Byron Shire Council, BySC; Lismore City Council, LCC and Richmond Valley Council, RVC).
- Strategic planning including yield studies, monitoring, water loss management and demand management.

The 2013 study found that major additional water supplies will be required to meet the growth in demand within the RCC bulk supply area and the TSC Bray Park system and actions to address the yield deficit in these systems have not yet been finalised. TSC is pursuing investigations relating to the raising of Clarrie Hall Dam and the drought security connection to South-east Queensland (SEQ) water link. RCC's priority from the FWS was the investigation of groundwater supplies and more recently, the potential for indirect potable reuse or the Marom Creek (Wardell) water supply to partially meet water supply needs within the bulk supply area (refer Section 2.6).

The 2013 study concluded that a regional approach may provide improved financial outcomes through economies of scale as well as access to a wider range of options to improve efficiency, system resilience and operational flexibility. The interconnection of RCC and TSC systems is considered to be a major component of a true regional approach. The potential non-regional supply options (raising Clarrie Hall Dam, SEQ link and groundwater supplies) have not yet been developed to a point where the future TSC and RCC supplies can be considered secure. TSC has confirmed that its current priority is the investigations for the raising of Clarrie Hall Dam and an emergency connection to SEQ water grid, however, the resulting augmented supply is expected to be sufficient to 2046 only. A review of the action plan (Hydrosphere Consulting, 2018a) found that the recommendations of the 2013 study in relation to interconnection of the RCC and TSC systems were still considered to be appropriate, even if this is not implemented in the short-medium term.

2.3 Future Water Strategy Integrated Water Planning Process (2014)

The 2014 FWS was adopted as a result of background information and decision making documented in an integrated water planning (IWP) process (MWH, 2014). The available information at that time indicated that existing water supplies are sufficient to meet annual demand until 2024 and by 2060 there would be a likely secure yield shortfall of approximately 6,500 ML/a (considering climate change).

The IWP process was used to define and analyse identified new water source options and included a coarse screening of options using a two-stage approach:

- Broad-based option identification and scoping.
- Coarse screening to test feasibility of options and remove non-feasible options.

Coarse screening was completed between 2010 and 2012 in conjunction with the FWS Project Reference Group (PRG) by GeoLink (2011). The coarse screening criteria were based on RCC's vision statement and included:

- Healthy - safe/fit for purpose.
- Reliable - availability, measureable benefit.
- Sustainable - meet principles of Ecologically Sustainable Design.

- Acceptable - community.
- Integration - resource management, infrastructure.
- Achievable - legal, practical, timeliness.

Cost was not considered as a criterion. A pass or fail was agreed for each option. The coarse screening outcomes are included in Appendix 1 and summarised in Table 2.

The coarse screening assessment will be updated with any new information available (this document).

Table 2: Coarse options screening outcomes – 2014 IWP process

No	Option	Description	Conclusion	Pass/Fail
1	**Potable Reuse**	This would involve treating sewage effluent from an existing or new sewage treatment plant to produce reclaimed water of a quality that would be suitable for drinking purposes. This water would then be provided direct to Rous Water consumers. This option involves a very complex water treatment process.	While this option can provide only limited benefits, it is a strategy that could be adopted in some circumstances and there are examples of this approach being used elsewhere in Australia.	Fail
2	**Raising Rocky Creek Dam**	This would entail raising the existing dam by up to 8 metres to a height of up to 36 metres and more than doubling the existing 14,000 ML storage capacity to 35,000ML. Because of the need to provide environmental flows, this would only increase the yield of the dam by about 8.5% or 1,200 ML/annum.	Because NPWS is likely to oppose this proposal and because of the environmental impacts associated with extensive removal of endangered ecological communities, this project is not recommended for further consideration. This is particularly so given that while the project is a major undertaking, it can only provide a very low increase in yield.	Fail
3	**Desalination**	Desalination of sea water or saline groundwater to provide significant amounts of water to one of the region's major urban areas. Could easily be staged in modules with capacities of say 1,000 ML/annum and augmented as required.	This option is considered suitable for further consideration. Energy usage and the sensitivity of the location are significant issues that will need to be addressed.	Pass
4	**Groundwater**	This could be achieved by developing a number of bore fields within the region each with a capacity of up to 2,000 ML/annum. Each bore field could be staged in modules of say 1,000 ML/annum and augmented as required.	This option is considered to be suitable for further consideration. The rights of other irrigators and groundwater dependent ecosystems are likely to be key issues.	Pass
5	**Urban Stormwater for Urban Irrigation**	This option entails collection and storage of urban stormwater runoff, followed by treatment and irrigation of the treated water onto open space areas.	While this option can provide only limited benefits, it is a strategy that could be adopted in some circumstances and there are examples of this approach being used elsewhere in Australia.	Pass

No	Option	Description	Conclusion	Pass/Fail
6	**Urban Stormwater for Non-potable urban use**	This option would entail provision of a significant storage dam downstream of a new urban development area, with a dedicated treatment plant and a dedicated reticulation system to supply treated water for outside use and toilet flushing within the new urban development area.	This option passes the coarse screening assessment. It should be noted however that it is unlikely in the foreseeable future that there will be any greenfield development sites that are suitable especially given that future development sites such as Ballina Heights are already committed to installing a dual water supply system to recycle reclaimed water (a strategy which provides a climate independent source).	Pass
7	**Potable Use of Urban Stormwater**	This option would entail harvesting urban stormwater runoff by providing a significant storage dam downstream of an urban development area. The collected water would then be pumped via a new dedicated pipeline to an existing water treatment plant (e.g. Nightcap WTP or Emigrant Creek WTP) for subsequent supply to consumers. In this way the stormwater would be used to supplement Rous Water's existing raw water sources (e.g. Rocky Creek Dam, Emigrant Creek Dam and the Wilson River Source).	Subject to finding a site that would provide sufficient catchment and storage capacity and is appropriate in respect of technical and environmental issues, this option is considered suitable for further consideration.	Pass
8	**Indirect Potable Reuse**	This involves provision of a sophisticated treatment process, pumping station and transfer pipeline to deliver highly treated reclaimed water directly into an existing major storage dam (e.g. Rocky Creek Dam or Emigrant Creek Dam) or possibly a groundwater source, for subsequent extraction, treatment and transfer using existing infrastructure.	While Australian Guidelines for Water Recycling: Managing Health and Environmental Risks provides guidelines for the implementation and management of these types of schemes, it is unclear at this stage whether this option would be supported by the NSW Ministry of Health. While recent experience elsewhere in Australia indicates that this option may not gain community support, in recognition of the trend of increasing community understanding of water treatment technology and water cycle management principles, this option cannot be discounted at this stage. It is therefore recommended that indirect potable reuse be subject to further consideration.	Pass

No	Option	Description	Conclusion	Pass/Fail
9	**Recycling of Reclaimed Water for Non Potable Urban Use**	This involves provision of further treatment of reclaimed water produced by a sewage treatment plant, and provision of a pumping station, transfer pipeline and dedicated reticulation system to deliver treated reclaimed water for outside use and toilet flushing within new urban development areas.	The option of developing dual water supply schemes for the recycling of reclaimed water for non-potable use passes all of the assessment criteria. There are a number of similar schemes that are approved and operating within NSW and this type of scheme is now being implemented at Ballina Heights. Because there is scope for further application within the Rous Water supply area, this option is worthy of further consideration.	Pass
10	**Regional connections – Casino / Rous Water**	This option involves the interconnection of the Rous Water supply with the Casino water supply sourced from Jabour Weir.	This option fails to pass the assessment as it does not provide a significant increase in water security for the Rous Water supply.	Fail
11	**Regional Connections – Purchase existing entitlements for Toonumbar Dam**	This option involves accessing existing water entitlements within the Toonumbar regulated water source. Water would be transferred to the Casino Water Treatment Plant for treatment to potable standards and then pumped into the Rous Water supply.	This option fails to pass the assessment as it does not provide sufficient water security during periods of low water availability.	Fail
12	**Regional Connections – Establish new Town Water Supply licence for Toonumbar Dam**	This option involves a new Town Water Supply licence within the Toonumbar regulated water source. Water would be transferred to the Casino Water Treatment Plant for treatment to potable standards and then pumped into the Rous Water supply.	This option passes the assessment, provided that the Licence conditions of the NSW Office of Water can be met.	Pass

Source: MWH (2014)

2.4 Regional Demand Management Plan (2019 – 2022)

The Regional Demand Management Plan (RDMP, Hydrosphere Consulting, 2018b) describes the water supply demand management initiatives to be implemented by RCC and its constituent councils over the next four years (2019 – 2022). These programs are part of wider strategies being implemented by RCC and the constituent councils, either individually or collectively, to ensure water supply security across the region. Demand management actions adopted in the plan area were as follows:

1. Monitoring, evaluation and reporting.
2. Water loss management.
3. Sustainable water partner program (businesses and community groups).
4. Smart metering.
5. Recycled water.
6. Rainwater tank rebates.
7. Community engagement and education – households.
8. Community engagement and education – schools.
9. Community engagement and education – high residential water users.

The updated demand forecast will consider the potential for reduction in demand resulting from the implementation of these measures.

2.5 Groundwater Investigations (2014 – 2018)

RCC has undertaken considerable investigations to identify and assess groundwater sources for future urban water supply between 2014 and 2018. These studies included extensive reviews and consultation with stakeholders to identify appropriate groundwater investigation areas as well as conducting groundwater drilling programs.

Detailed investigations into the Woodburn bore site have found that 3 – 4 production bores could meet the demand from the RVC (Lower Richmond River) supply area. Water quality was determined to be suitable for drinking water if appropriate treatment is implemented (iron and manganese removal) (Jacobs, 2018a). A concept design has been prepared for the infrastructure needed and capital cost estimates for a new standalone bore field and water treatment scheme at Woodburn, capable of supplying treated water at 2060 average day demands to the lower river area (Jacobs, 2018b).

The groundwater sources investigated in Newrybar (coastal sands), Woodburn (coastal sands) and Dunoon (fractured rock aquifers) will require higher cost, additional treatment and may not be as reliable as assumed in the FWS IWP process. In addition, the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources* excludes additional aquifer access licences in the Alstonville Basalt Plateau groundwater source as the long-term average annual extraction limit is less than existing water requirements. Potential groundwater schemes will be further investigated as part of the FWS review (refer Section 2.8).

2.6 Marom Creek Master Plan (2018)

BSC has recently developed a 20-year Master Plan for the Marom Creek water treatment plant (WTP) and related assets (City Water Technology, 2018). The Master Plan identifies WTP improvements required to address operational issues, process performance and monitoring, maintaining compliance with drinking water quality standards, refurbishment or replacement of existing assets and maintaining capacity to meet current and future demands. The Master Plan covers the Marom Creek catchment and supply from Marom

Creek Weir including demand requirements for existing Wardell customers and potential servicing of Alstonville and Wollongbar (currently served by the RCC bulk supply system).

Data on current secure yield of Marom Creek Weir assumed in the Master Plan was based on a secure yield study (NSW Urban Water Services, 2017) which assesses the current and future secure yield from the weir storage with capacity of 66 ML and 420 ML (based on two different estimates of existing storage capacity), Marom Creek WTP capacity (existing 225 kL/d and upgraded to 4.75 ML/d) and the licence extraction limit (200 ML/a).

The yield of the existing Marom Creek weir has been assessed as sufficient to service Wardell into the future. Source augmentation would be required to service other areas e.g. Alstonville or parts of Lismore (either by raising the existing weir or groundwater bores).

Options considered in the Master Plan to increase the supply of water were:

- Raising Marom Creek Weir to increase storage to 420 ML.
- Gum Creek Weir - a small, disused weir located near the intersection of Gum Creek and Dalwood Road.
- Lindendale bores - aquifer supply previously used for drinking water.
- Ellis Road bore - aquifer supply previously used for drinking water.

The Master Plan recommended a supply strategy including raising Marom Creek Weir and increasing the licence extraction limit to 1,258 ML/a (future demand is predicted to be 1,126 ML/a) and refurbishment of Ellis Road bore and connection to Marom Creek WTP (to be upgraded).

The RCC yield study report (NUWS, 2018) assessed the yield of the RCC bulk supply system with Marom Creek water supply included and found that the secure yield with historic climate would increase by 932 – 1,011 ML/a depending on the Wardell demand.

Reinstatement of the former groundwater supplies in the area appears to be an attractive groundwater option on a yield basis. In addition RCC and Ballina have existing licences with approximately 90% of the extraction volume required.

2.7 Toonumbar Dam

RCC has provided information on Toonumbar Dam water usage from discussions with WaterNSW. Utilisation of water from Toonumbar Dam is generally low as existing licence holders do not fully exhaust their entitlements as unregulated surface water and groundwater sources are also available and these are preferred by the major water users due to lower water usage charges. Licence holders use from 55 to 950 ML/a from Toonumbar Dam. Anecdotal evidence suggests that surface water licences are currently used as a drought security measure. During summer 2019/20, the level in Toonumbar Dam was very low which is attributed to increased use of Toonumbar Dam licences and low inflows.

Toonumbar Dam has 3,000 ML/a of available general security supply which is predicted to be equivalent to 1,250 ML/a of high security town supply. However, it is not possible to convert existing water entitlements to town water supply (TWS) licences under the existing Water Sharing Plan for the Richmond River. The Water Sharing Plan is due for review in 2020.

Local councils have been in discussions with Water NSW during 2019 about the potential to access additional releases from Toonumbar Dam. WaterNSW is currently undertaking modelling to confirm the available capacity for allocation of additional extraction licences as part of the 20 year infrastructure options study and the NSW Government may consider options involving increased use of Toonumbar Dam for town water supply. RCC considers that options involving raising of Toonumbar Dam and increased access to water for town water supply needs are potentially viable source augmentation options.

2.8 New Studies

RCC has commissioned various technical studies as part of the review of the FWS to be undertaken in 2019/20. These are summarised in Table 3. The outcomes of these studies were not available for this coarse options assessment.

Table 3: FWS review studies – 2019/20

Study	Scope
Review of demand forecast	Updates of 2013 Demand Forecast: · Existing number of connections. · Current average water consumption for each connection type. · Current water demand profile. · Predicted future growth for each connection type. · Predicted future consumption trends for each connection type. · Future (2020 to 2060) demand forecast.
Environmental flows assessment	· Extent of influence of RCD, Emigrant Creek Dam (ECD) and Wilsons River Source (WRS) and the proposed Dunoon Dam on the downstream environment. · Existing Water Sharing Plans, licenses and usage with the source areas of the Wilson River system, Emigrant Creek and the fractural basalt and coastal groundwater systems. · Regulatory requirements. · Environmental and habitat values of the creek system including ecological and biodiversity values of water dependent in-stream and terrestrial ecosystems and fluvial geomorphology downstream. · Appropriate flow regimes for the environmental values identified. · Quantity, timing and release requirements of flows to maintain or enhance the environmental values downstream of the dams or water source. · Ecological monitoring requirements.
Groundwater investigations	For Tyagarah, Newrybar and Alstonville schemes: · Sustainable yield. · Long term average annual yield or permitted extraction volumes. · Spacing of “typical” bore installations. · Range of water level draw down in bores. · Maximum instantaneous flow rate with operating restrictions. · Maximum instantaneous flow rate with operating restrictions. · Bore redundancy allowance. · Bore layout. · Historic raw water quality. · Treatment requirements. · Risk assessment. · Scheme concept development.

Study	Scope
Indirect Potable Reuse (IPR)	Feasibility assessment: · Environmental flow substitution opportunities and potential offsets. · Water gauging station / licensing requirements for the Wilson River source. · Current and future recycled water schemes within the region and their effectiveness in reducing use of RCC water. · Additional opportunities and their demands including urban dual reticulation for residential and industrial end uses and urban open space / rural agriculture irrigation within each LGA and wastewater treatment plant (WWTP). · Daily and annual volume of RCC potable water savings that would be achieved from each opportunity. · Current and projected effluent discharges and their quality from the regions WWTPs. · Potential IPR source volumes and the required quality and relevant constraints at each of the WWTPs. · Potential IPR scheme options and their respective treatment requirements both at constituent Council's WWTPs as well as RCC's potable WTPs. · Design consideration to mitigate and manage public health risk. · Current technology, industry standards and best practice in reference to indirect potable reuse schemes within Australia and overseas. Whole of system concept designs and costings (for viable schemes): · Feasibility level proof of concept assessment of the treatment systems, pump stations and rising mains and site associated infrastructure. · Project risk and mitigation assessments. · Construction and operational cost estimations. · 80-year whole of life cycle costing assessment.
Desalination	· Current technologies, industry standards and best practice in reference to desalination within Australia and overseas. · Potential desalination plant and power source options. · Potential locations for desalination plant considering infrastructure requirements, particularly feed source water, integration to existing water distribution networks, power infrastructure and reject water (brine) management needs. · Feasibility level proof of concept. · Environmental and social planning issues. · Feasibility level proof of concept assessment of the treatment systems, pump stations and rising mains, as well as site infrastructure associated with scheme options. · Project risk and mitigation assessments. · Construction and operational cost estimation. · 80-year whole of life cycle costing assessment.

Study	Scope
Dunoon Dam	· Gap analysis of supporting infrastructure and capital costs estimation requirements. · Preliminary longitudinal elevation plans for the proposed rising main and construction and easement acquisition costs. · Infrastructure maintenance and renewal requirements. · Review of total project (capital) cost estimations for both the 20 GL and 50 GL dam size. · 80-year whole of life cycle costing assessment. Related specialist studies: · Road transport network and road improvements. · Land property evaluations. · Peer review of capital and maintenance costings. · Economic viability of downstream discharge structure to incorporate mini-hydroelectricity generation plant feeding power to the site and/or the electricity grid. · Flood impacts.
Secure yield assessments	Update current and future secure yield assessments using RCC GoldSim Bulk Water Supply Security Model for various supply scenarios.

3. COARSE SCREENING ASSESSMENT

3.1 Review of Options

The coarse screening assessment undertaken for the 2014 FWS has been updated where new information is available. The options included in the coarse assessment and the results of the assessments undertaken as part of the 2014 FWS are detailed in Table 4.

Table 4: Water supply options

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
1 - Do nothing – status quo							
1	River/creek raw water extraction (current system)	Existing RCC supply – RCD, ECD and WRS.	No augmentation of supply.	Yield and operating rules from previous studies and GoldSim model.	Not included	Not included	Fail
2- Existing source augmentation							
2a	Raise RCD	Raising the existing dam by up to 8 metres to a height of up to 36 metres and increasing the storage capacity from 14,000 ML to 35,000 ML. Because of the need to provide environmental flows, this would only increase the yield of the dam by about 8.5 % or 1,200 ML/a.	Raising by up to 8 m is technically feasible. It would not be feasible to raise the dam more than this since that would require the new embankment to extend over the existing spillway.	2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014).	2 – not recommended	L - Not considered further due to high capital cost and environmental impact for low future yield	Not included – the IWP process findings are still considered valid
2b	Raise ECD	Raise the existing dam.	Raising ECD is not viable as the site geology significantly limits the height to which the dam could be raised, and the relatively small catchment area results in only a very small increase in yield.		2 – not feasible	Not included	Not included – the IWP process findings are still considered valid

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
3 - Toonumbar Dam							
3a	Purchasing or trading existing water entitlements – Toonumbar Dam	Accessing low security existing water entitlements within the Toonumbar regulated water source. Water would be transferred to the Casino WTP for treatment to potable standards and then pumped into the RCC supply.	RCC may be able to buy existing licences, but these would not provide the level of security provided by a TWS licence.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014). · Liaison with NSW Government as part of state planning actions.	11 – fail	I – purchase of general security licences and conversion to TWS licences when water sharing plan is reviewed. Not considered further.	Not included – the IWP process findings are still considered valid
3b		New TWS licence within the Toonumbar regulated water source under existing Water Sharing Plan. Water would be transferred to the Casino WTP for treatment to potable standards and then pumped into the RCC supply.	RCC may apply for a new TWS licence within the Toonumbar regulated water source if it is able to demonstrate that there are no adverse impacts to the existing levels of performance of the supply or to its licence holders.		12 - pass		
3c	Pipeline from Toonumbar Dam or Eden Creek to Casino WTP or RCD (town water supply licence)	Similar to 3b. Requires modification of water sharing plan. Augmentation of Casino WTP required.	No details available.	Liaison with NSW Government as part of state planning actions.	Not included	Not included	Fail – unlikely to provide water supply needs

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
3d	Raising Toonumbar Dam	10 m or 20 m raising has previously been considered. Water would be transferred to the Casino WTP for treatment to potable standards and then pumped into the RCC supply.	No details available.	Liaison with NSW Government as part of state planning actions.	Not included	Not included	Further consideration is recommended (additional information required to confirm feasibility)
4 - Dunoon Dam							
4a	Staged Dunoon Dam (20 GL – 50 GL)	Initial 20 GL storage on Rocky Creek with provision for future raising to 50 GL. Water would be transferred to Nightcap WTP for treatment.	Infrastructure required includes dam, transfer pumping station and mains, roads and land acquisition. RCC conducted detailed investigations for Dunoon Dam and has resolved to build Dunoon Dam if and when it is needed to secure supply.	· 2014 FWS and historical studies (MWH, 2014). · Concept design.	Not included	H – technically viable, but with significant environmental and social constraints associated with threatened and endangered terrestrial ecology and culturally significant Aboriginal heritage. Included in FWS scenarios (staged 20 GL dam with future increase to 50 GL) and recommended as contingency measure.	Further consideration is recommended

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
4b	Toonumbar Dam environmental flows to offset Dunoon Dam release requirements	Operational changes being considered by WaterNSW.	No details available.	Liaison with NSW Government as part of state planning actions.	Not included	Not included	Further consideration is recommended as a complementary action with Dunoon Dam
5 - Regional interconnection							
5a	Connection to Tweed Shire Bray Park system and Dunoon Dam	Interconnection of the RCC and Bray Park systems with source augmentation (raising Clarrie Hall Dam with Dunoon Dam) – scenarios from Northern Rivers Regional Bulk Supply Study.	Insufficient information to enable a full assessment of the scenarios including environmental, social and financial details, energy requirements, greenhouse gas emissions, ecological impacts, heritage impacts as well as stakeholder and community support. Tweed Shire Council is planning to raise Clarrie Hall Dam as a short-term augmentation option for the Bray Park water supply and therefore does not support this option.	Northern Rivers Regional Bulk Supply Study.	Not included	Not included	Fail - Further consideration is recommended as a long-term solution (additional information required to confirm feasibility)
5b	Connection to Tweed Shire Bray Park system and Toonumbar Dam	Option 5a with connection to Toonumbar Dam.			Not included	Not included	

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
5c	Connection to Casino (Jabour Weir)	Interconnection of the RCC supply with the Casino water supply sourced from Jabour Weir. Preliminary modelling results (NUWS, 2012) suggest that the interconnection of the Casino and RCC water supplies would provide a yield benefit of 160 ML/a for RCC (with environmental flow allowances but not considering climate change impacts).	RCC and Casino water supplies would be interconnected by a single water main so that treated water could be directed from either RCC to Casino or vice versa, depending upon need. The system would potentially involve some upgrades to existing WTPs and would require some pumping of water.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014). · Studies undertaken by RVC and RCC.	10 - fail	Not included due to insufficient yield	Not included - – the IWP process findings are still considered valid
5d	Connection to Marom Creek WTP	Raised Marom Creek Weir and reinstatement of aquifer supplies and upgraded WTP to supply Alstonville/Wollongbar with excess to Lismore.	Environmental flow requirements with raised weir have not been considered. Advice from DPIE - Water indicates release requirements could be similar to previous licence requirements but increased extraction is assumed to be acceptable under current WSP. Fish passage requirements have not been considered.	Studies undertaken by BSC (City Water Technology, 2018; NSW Urban Water Services, 2017)	Not included	Not included	Yield of Marom Creek supply and potentially groundwater supplies and raising of the weir is uncertain but offers diversification of surface water sources for RCC. Further consideration is recommended

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
6 - Groundwater							
6a	Groundwater extraction	Various groundwater supplies have been considered.	Recent investigations focussed on reinstatement of bores at Woodburn but will include Tyagarah, Newrybar and Alstonville schemes.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014). · Recent RCC investigations (Section 2.5).	4 - Pass	F – existing bores, new coastal sands, fractured basalt or Kangaroo Creek sandstone sources. Included in FWS scenarios and adopted as part of FWS.	Further consideration is recommended

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
7 - Stormwater							
7a	Urban stormwater irrigation	Collection and storage of urban stormwater runoff, followed by treatment and irrigation of the treated water onto open space areas.	Decentralised option that could be used as a means of substituting potable water use. The water requires treatment and disinfection to provide safe end use. In order to reduce the demand for potable water, this option would need to be applied as a retrofit to an existing irrigation system that presently uses potable water or it would need to be used as an alternative for a future proposed open space irrigation project. Most open space areas are not irrigated with town water.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014; Hydrosphere Consulting, 2016).	5 - limited benefit	C – considered as a demand management measure	Not included – the IWP process findings are still considered valid

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
7b	Non-potable urban stormwater reuse (dual reticulation)	Provision of a significant storage dam downstream of a new urban development area, with a dedicated treatment plant and a dedicated reticulation system to supply treated water for outside use and toilet flushing within the new urban development area.	Similar to Option 7a. There are significant challenges associated with retrofitting new pipework to existing streets and modifying the plumbing within existing dwellings, hence this option would only be applied in greenfield developments. Requires a sufficient catchment area and storage capacity and is suitable in respect of technical and environmental considerations.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014).	6 – unlikely that suitable greenfield developments will exist	C – to be considered as a demand management measure	Not included in FWS or RDMP.

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
7c	Indirect potable urban stormwater reuse	Harvesting urban stormwater runoff by providing a storage dam downstream of an urban development area. The collected water would then be pumped via a new dedicated pipeline to an existing WTP (e.g. Nightcap WTP or Emigrant Creek WTP) for subsequent supply to consumers.	Similar to Option 7b.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014).	7 - suitable for further consideration.	B – Goonellabah, Alstonville and Cumbalum catchments. Not considered further following detailed assessment. Aquifer recharge included as a back-up option in FWS groundwater scenario (stormwater reuse).	Not included -– the IWP process findings are still considered valid

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
8 - Desalination							
8a	Desalination	Conversion of saline water to fresh water suitable for potable use. Climate resilient water source but with significant power requirements and brine management constraints. Staged desalination plant capacity.	Tyagarah (marine feed water), Lennox Head (groundwater feed water) and South Ballina (estuarine feed water) considered in IWP process. The Northern Rivers Regional Bulk Supply Study considered a marine water desalination plant between Ocean Shores and Pottsville to supplement a regional supply network.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014).	3 - Pass	G – Tyagarah and South Ballina (marine feed water). J – Regional interconnection (NOROC study). Included in FWS scenarios and recommended as safeguard measure.	Further consideration is recommended

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
9 – Wastewater recycling							
9a	Indirect potable reuse (IPR) to surface waters	Provision of a sophisticated treatment process, pumping station and transfer pipeline to deliver highly treated reclaimed water directly into an existing major storage dam (e.g. RCD or ECD) or WRS for subsequent extraction, treatment and transfer using existing infrastructure.	A new water source that is always available even in drought conditions. A complex treatment process will be required. There are significant distances between the existing storage dams and the existing WWTPs, so this option would involve considerable pumping and pipeline infrastructure. Recent RCC investigations have focussed on schemes involving treated effluent from Ballina/Lennox Head, Alstonville and Bangalow transferred to ECD.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014).	8 - recommended for further consideration	D – East and South Lismore STPs, Alstonville STP, Ballina and Lennox Head STPs. Included in FWS scenarios and recommended as contingency measure.	Further consideration is recommended

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
9b	Dual reticulation (urban)	Provision of further treatment of reclaimed water and provision of a pumping station, transfer pipeline and dedicated reticulation system to deliver treated reclaimed water for outside use and toilet flushing within new urban development areas.	Similar to Option 7b. Utilisation of urban recycled water in Ballina Shire has been lower than predicted.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014). · RDMP	9 - recommended for further consideration	E – existing Ballina Shire schemes	Not included. Included in RDMP (Ballina Shire and Byron Bay).
9c	Managed aquifer recharge with treated wastewater effluent.	Intentional recharge of an aquifer under controlled conditions, either by injection or infiltration, in order to store a water source for later abstraction and use (indirect reuse), or for environmental benefits. RCC does not currently utilise groundwater apart from emergency sources.	In coastal sand aquifers, schemes generally involve injection or irrigation of surplus water and then re-abstraction of the water when it is required. In hard-rock aquifers, schemes generally use direct injection of waters (e.g. summer excess from local surface waters or treated stormwater or effluent) via boreholes screened in confined aquifers with sufficiently high permeability. No specific opportunities were identified for inclusion in the FWS.	· 2014 FWS and historical studies (MWH, 2014).	Not included	Included as a back-up option in FWS groundwater scenario (wastewater reuse).	Not included. Groundwater options including aquifer recharge may be considered feasible pending outcomes of the current studies. This will be treated as a groundwater supply option (similar to the 2014 FWS) as aquifer recharge is not an augmentation option by itself.

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
9d	Direct potable reuse	Treating sewage effluent from an existing or new WWTP to produce reclaimed water of a quality that would be suitable for drinking purposes. This water would then be provided direct to consumers.	This option involves a very complex water treatment process. Currently there is no state or national framework for direct potable reuse.	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014).	1 - Not seen as a feasible short-term building block for FWS, but could be included with a watching brief for reconsideration in the future if circumstances change.	Not included	Not included -– the IWP process findings are still considered valid.
10 - Demand Management							
10a	Water loss management	Water loss management plans are being developed as part of the implementation of the RDMP. Smart metering is also being investigated.	Not available.	RDMP	-	A – Enhanced demand management included in FWS scenarios and adopted as part of FWS.	Not included. Included in RDMP. Source augmentation will still be required.
10b	Other demand management	The RDMP includes other demand management actions.	Sustainable water partner program, rainwater tank rebates, community engagement and education.	RDMP	-		

No.	Option	Description	Additional details	Data sources	2011 coarse screen option and conclusion	2014 IWP process option and conclusion	2020 screening outcome (Table 6)
11 - Drought management							
11a	Revised restrictions	Increased duration, frequency and intensity of enforced restrictions.	-	· 2014 FWS and historical studies (GeoLINK, 2011; MWH, 2014).	-	K – Reduced level of service (10/15/15 and 10/20/40). 5/15/15 included in FWS scenarios as contingency measure pending community acceptance.	Not recommended due to increased financial risk of emergency response. Does not comply with NSW Government guidelines.

3.2 Assessment Criteria

The assessment criteria used in the coarse screening are detailed in Table 5 (as specified by RCC).

Table 5: Coarse screening assessment criteria

Criteria	Measure	Description	Objectives
Healthy	Safe/fit for purpose	The option meets water quality and/or health legislation and guidelines relevant to its intended use. The option can be delivered in a safe manner to all consumers i.e. clear identification of non-potable water supplies.	Option is appropriate for its intended use. Option does not represent a health risk to consumers.
Reliability	Beneficial	Analysis indicates that the option will result in a measurable improvement in water security through either a reduction in water demand, an increase in water supply or both.	Option improves long term water security.
	Availability	The option can provide benefit during anticipated times of need, such as during drought or other periods of high-water demand. Water availability shall inform demand and may restrict supply.	Option able to provide benefit when required.
Sustainability	Ecological sustainability	Overall, the option is “ecologically sustainable” when measured against accepted measures of sustainability. Consideration given to resource consumption particularly electricity use and carbon emissions. Sustainability considered against current and future demand.	Option is compatible with principles of ecologically sustainable development and intergenerational equity.
Acceptability	Community support	Provided with enough information regarding an option, the broader community would be considered likely, on balance, to provide support for the proposed option.	Option likely to have broad, measured community support.
Compatibility	Necessary	The option is considered as a necessary response that will improve water security based on future supply and demand forecasting of need.	Option is necessary given expected future water supply and demand characteristics.
	Planning Integration	Option is appropriate to and/or can be incorporated or adopted within regional planning processes.	Option is compatible with planned future needs.

Criteria	Measure	Description	Objectives
Achievability	Government support	Option conforms with existing government legislation and policy.	Option is achievable under existing legislation and government policy.
	Practically viable	Option can realistically be achieved by RCC.	Option is technically achievable utilising existing knowledge and capabilities.
	Built environment	The option can be implemented into existing and/or planned future built environments.	Option can be practically incorporated into existing or future built environment.
	Timeliness	Option can be delivered in an appropriate timeframe so that its benefit is provided without unduly restricting water security.	Option can be delivered in an appropriate timeframe to achieve its expected outcomes.

3.3 Assessment Outcomes

The coarse screening assessment of the options considered potentially feasible from Section 3.1 is provided in Table 6.

The assessment outcomes are:

Pass	the option is expected to achieve the assessment criteria objectives
Unknown	there is insufficient information to indicate a pass or fail
Fail	the option is not expected to achieve the assessment criteria objectives

Table 6: Coarse screening assessment

No.	Option	Health	Reliability		Sustainability	Acceptability	Compatibility		Achievability				Conclusion
		Safe/fit for purpose	Beneficial	Availability	Ecological sustainability	Community support	Necessary	Planning integration	Government support	Practically viable	Built environment	Timeliness	
1	River/creek raw water extraction (current system)	Pass – existing water treatment facilities are adequate	Fail – no improvement in water security	Pass (until 2024) then Fail as demand will exceed supply availability	Pass – existing impacts are considered acceptable	Pass (until 2024) then Fail as water security will not be achieved	Fail – options are available to increase supply	Fail – will not meet future needs	Fail – security of supply is not achieved	Pass – no augmentation included	Pass – no augmentation included	Pass – no augmentation included	Fail – does not achieve project objectives
3c	Pipeline from Toonumbar Dam or Eden Creek to Casino WTP or RCD	Pass – water treatment requirements can be met	Fail – expected yield 300 ML/a.	Pass – assuming high security licence can be provided	Pass - resource consumption is expected to be high but could be offset	Pass - impacts on Toonumbar Dam users are unknown but could be managed	Fail – does not provide any advantages to RCC bulk supply	Fail – Water Sharing Plan does not permit new TWS licences	Unknown – being investigated as part of NSW government planning	Pass - relies on support and action by NSW government	Pass – new infrastructure required can be integrated into existing scheme	Fail - unlikely achievement of legislative changes and government and community support within required timeframe	Fail – unlikely to provide water supply needs
3d	Raising Toonumbar Dam 10 - 20 m	Pass – water treatment requirements can be met	Unknown (available quantity and yield to be confirmed)	Unknown (drought supply to be confirmed)	Pass - resource consumption is expected to be high but could be offset	Pass - impacts on Toonumbar Dam users are unknown but could be managed	Pass – dam may be raised for rural user needs	Pass assuming Water Sharing Plan is amended	Unknown – being investigated as part of NSW government planning	Pass - relies on support and action by NSW government	Pass – new infrastructure required can be integrated into existing scheme	Pass (subject to achievement of legislative changes and government and community support)	Pass - Further consideration is recommended (additional information required to confirm feasibility)
4a	Staged Dunoon Dam (20 GL – 50 GL)	Pass – water treatment requirements can be met	Pass – additional secure yield of 11,300 ML/a at 2060	Pass – provides climate dependent supply	Pass - environmental impacts require offset	Pass – if all other options are unacceptable	Pass – augmentation of Rocky Creek supply will improve water security	Pass – approvals process required	Pass – approvals process required	Pass – technical feasible	Pass – new infrastructure required can be integrated into existing scheme	Pass – substantial investigations already completed	Pass - Further consideration is recommended
4b	Toonumbar Dam environmental flows to offset Dunoon Dam release requirements	Pass – water treatment requirements can be met	Pass – additional secure yield resulting from environmental flows	Pass – provides climate dependent supply	Pass - environmental impacts require offset	Pass – if all other options are unacceptable	Pass – augmentation of Rocky Creek supply will improve water security	Pass – approvals process required	Unknown – being investigated as part of NSW government planning	Pass - relies on support and action by NSW government	Pass – new infrastructure required can be integrated into existing scheme	Pass (subject to achievement of legislative changes and government and community support)	Pass - Further consideration is recommended as a complementary action with Option 4a.
5a	Connection to Tweed Shire Bray Park system and Dunoon Dam	Pass – water treatment requirements can be met	Unknown (available quantity and yield to be confirmed)	Unknown (drought supply to be confirmed)	Pass - resource consumption and environmental impacts are unknown but could be offset	Pass – if all other options are unacceptable	Pass – regional interconnection and augmentation of Rocky Creek supply will improve water security	Pass (as a long-term strategy only as unlikely to receive support from TSC in the short-term)	Pass – approvals process required	Pass (relies on support and action by TSC)	Pass – new infrastructure required can be integrated into existing scheme	Fail (potential long-term solution or future stage)	Fail - Further consideration is recommended as a long-term solution (additional information required to confirm feasibility)

No.	Option	Health	Reliability		Sustainability	Acceptability	Compatibility		Achievability				Conclusion
		Safe/fit for purpose	Beneficial	Availability	Ecological sustainability	Community support	Necessary	Planning integration	Government support	Practically viable	Built environment	Timeliness	
5b	Connection to Tweed Shire Bray Park system and Toonumbar Dam	Pass – water treatment requirements can be met	Unknown (available quantity and yield to be confirmed)	Unknown (drought supply to be confirmed)	Pass - resource consumption and environmental impacts are unknown but could be offset	Pass - impacts on Toonumbar Dam users are unknown but could be managed	Pass – regional interconnection and augmentation of Toonumbar Dam supply will improve water security	Pass (as a long-term strategy only as unlikely to receive support from TSC in the short-term)	Pass – approvals process required	Pass (relies on support and action by TSC)	Pass – new infrastructure required can be integrated into existing scheme	Fail (potential long-term solution or future stage)	Fail - Further consideration is recommended as a long-term solution (additional information required to confirm feasibility)
5d	Marom Creek WTP	Pass – water treatment requirements can be met	Unknown (available quantity and yield to be confirmed)	Unknown (drought supply to be confirmed)	Pass - resource consumption and environmental impacts are unknown but could be offset	Pass – unlikely to be significant opposition	Pass – alternative surface water source will increase reliability	Pass – approvals process required	Pass – approvals process required	Pass (relies on support and action by BSC)	Pass – new infrastructure required can be integrated into existing scheme	Pass – components can be implemented in stages. Weir raising may require additional time for approval	Pass - Further consideration is recommended (additional information required to confirm feasibility)
6a	Groundwater harvesting	Pass – water treatment requirements can be met	Pass – localised sources can be developed to meet demand	Pass – provides climate dependent supply	Pass - resource consumption can be offset	Pass – unlikely to be significant opposition	Pass – groundwater source will increase reliability	Pass – approvals process required	Pass – approvals process required	Pass – technical feasible	Pass – new infrastructure required can be integrated into existing scheme	Pass – can be implemented in stages	Pass - Further consideration is recommended
8a	Desalination	Pass – water treatment requirements can be met	Pass – yield is only limited by treatment capacity	Pass – provides climate independent supply	Pass - resource consumption and environmental impacts can be offset	Pass – unlikely to be significant opposition	Pass – climate independent source will increase reliability	Pass – approvals process required	Pass – approvals process required	Pass - may require support and action by other LWUs	Pass – new infrastructure required can be integrated into existing scheme	Pass – can be implemented in stages	Pass - Further consideration is recommended
9a	Indirect potable reuse (IPR) to surface waters	Pass – public and environmental health risks to be addressed	Unknown (available quantity and yield to be confirmed)	Unknown (available quantity and yield to be confirmed)	Pass - resource consumption and environmental impacts can be offset	Unknown – community acceptance to be determined	Pass – climate independent source will increase reliability	Pass – approvals process required	Pass – approvals process required	Pass - may require support and action by other LWUs	Pass – new infrastructure required can be integrated into existing scheme	Pass – can be implemented in stages	Pass - Further consideration is recommended (additional information required to confirm feasibility)

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GLOSSARY AND ABBREVIATIONS

BSC	Ballina Shire Council
BySC	Byron Shire Council
DPIE	NSW Department of Planning, Industry and Environment
ECD	Emigrant Creek Dam
FWS	Future Water Strategy
IPR	Indirect potable reuse
IWP	Integrated water planning (process)
KC	Kyogle Council
kL	Kilolitres (1,000 litres)
LCC	Lismore City Council
LWU	Local Water Utility
m	Metres
ML	Megalitres (1,000,000 litres)
ML/a	Megalitres per annum
NOROC	Northern Rivers Regional Organisation of Councils
RCC	Rous County Council
RCD	Rocky Creek Dam
RDMP	Regional Demand Management Plan
RVC	Richmond Valley Council
SEQ	South-east Queensland
TBL	Triple bottom line (environmental, social, financial)
TSC	Tweed Shire Council
TWS	Town water supply (licence)
WRS	Wilsons River Source
WTP	Water treatment plant
WWTP	Wastewater treatment plant

Appendix 1. ORIGINAL COARSE SCREENING ASSESSMENT (GEOLINK, 2011)

Water Option 1	Description	Notes
Potable Reuse	*This would involve treating sewage effluent from an existing or new sewage treatment plant to produce reclaimed water of a quality that would be suitable for drinking purposes. This water would then be provided direct to Rous Water consumers. This option involves a very complex water treatment process.*	*As an example, effluent from one of the existing sewage treatment plants at Lismore could be used to provide up to 3,500ML / annum of drinking water.*

Option 1 – Potable Reuse					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use	PASS		· Can be safe and fit for purpose, requires appropriate systems including highly sophisticated processes, detailed monitoring, and emergency contingencies. · Remains a significant risk; this is why Department of Health does not approve even though there are examples operating in other parts of the world.
Reliable	Measurable benefit	Option provides a measurable benefit to water security	PASS		· Can provide measureable benefit since it is fundamentally very reliable, barring major pollution incidents.
	Availability	Option provides benefits when required	PASS		· The treatment process units can be built as modules thereby allowing flexibility in staging to match variation in demands · This source is consistent and reliable, and because of the nature of the process it would be preferable to operate the plant continuously 24/7

Option 1 – Potable Reuse					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development · Energy · Waste stream · Non-renewable resources · Carbon footprint · Local environment · $ not considered at this stage	PASS		· Energy embodied in the construction of the treatment plant would be modest. Ongoing energy usage for this type of treatment is high but potentially can be offset by employing renewable resources with the cost of doing so being a further consideration in detailed analysis. · While most of the water is recycled, there remains a waste stream in the form of a concentrated liquid that will require dewatering and solids disposal. · A significant amount of non-renewable resources required for the construction of the treatment plant. · Carbon footprint is relatively high for the construction of the treatment plant and for the ongoing operations and maintenance, particularly given the complexity of the process. · Local environment – plant could be co-located with Sewage Treatment Plant (STP) and within its associated buffer, therefore local environmental impacts would be minimal.
Acceptable	Community support	Community is likely to support the option/s		FAIL	· While these types of systems have been introduced overseas, attempts to do so here in Australia have failed. · Unlikely to gain community support - it can be quite divisive issue. · There are social equity issues. It is likely that only one particular geographical area would be supplied with the recycled water whereas the majority of consumers would not be connected to this source.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	PASS		· The treatment process units can be built as modules thereby allowing flexibility in staging to match variation in demands.

Option 1 – Potable Reuse					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Physical integration	Option matched to existing and future infrastructure needs	PASS		· Good physical integration possible, since it can be easily retro-fitted to STPs located close to major population centres, and it would connect readily into the existing distribution system.
Achievable	Legally achievable	Option is achievable under existing legislation		FAIL	· Not legally achievable at present since Department of Health will not approve. · Rous Water has previously attempted to initiate a joint program with state and federal agencies to develop guidelines for potable reuse, but could not secure financial support from those agencies.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	PASS		· It is technically achievable and it has been done successfully overseas.
	Built environment	Option can be practically incorporated into existing or future built environment	PASS		· Yes it can be practically incorporated into the built environment.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes		FAIL	· Based on current legal and social impediments, it is unlikely that this technology can be delivered within appropriate timeframe. That may change at some time in the future.
Draft Conclusion		· Not seen as a feasible short-term building block for future water strategy, but could be included with a watching brief for reconsideration in the future if circumstances change, but there would be no further work to refine this option prior to completion of the future water strategy			

Water Option 2	Description	Notes
Raising Rocky Creek Dam	*This would entail raising the existing dam by up to 8 metres to a height of up to 36 metres and more than doubling the existing 14,00ML storage capacity to 35,000ML. Because of the need to provide environmental flows, this would only increase the yield of the dam by about 8.5% or 1,200ML/annum.*	*PWD study in 1995 indicated that this would be technically feasible. It would not be feasible to raise the dam more than this since that would require the new embankment to extend over the existing spillway.* *The other option of raising Emigrant Creek Dam (existing yield 1,500ML/annum) is not viable. This is because the site geology significantly limits the height to which that dam could be raised, and that, coupled with the relatively small catchment area, results in only a very small increase in yield.*

Option 2 – Raising Rocky Creek Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use	PASS		· Water sourced by raising Rocky Creek dam would be safe and fit for purpose since it would utilise both the existing protected catchment and the Nightcap water treatment plant
Reliable	Measurable benefit	Option provides a measurable benefit to water security	PASS		· Under the existing operating regime, this strategy would significantly improve the yield of the existing dam. However provisions for environmental flows maker the improvement in yield very modest. .
	Availability	Option provides benefits when required	PASS		· Subject to authority approvals, the raising of Rocky Creek Dam could provide the benefits when required however it would entail a relatively long lead time of at least 8 years

Option 2 – Raising Rocky Creek Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development · Energy · Waste stream · Non-renewable resources · Carbon footprint · Local environment · $ not considered		FAIL	· Significant energy would be embodied within the construction – the scale of work would be similar to constructing a completely new dam. However, compared to the existing dam, the ongoing energy usage would be reduced because of the higher water level. · Given the relatively good quality of this water, the waste stream would be minimal. There would be an increase in the production of sludge from the existing water treatment plant. This increase would be proportional to the increase in water abstraction. (The sludge is presently used to rehabilitate a disused quarry). · A significant amount of non-renewable resources required for the construction of the dam embankment. · Carbon footprint is relatively high for the construction of the dam embankment. For the ongoing operations and maintenance, there will be a relatively low carbon footprint, nevertheless dam storages are considered to be net emitters of greenhouse gases. · Local environmental impacts will be significant in that the higher storage level will flood up to 90 hectares of sub-tropical rainforest and sclerophyll forest, including parts of the Nightcap National Park. Conversely, this option would have downstream benefits in that it would include provision of environmental flows that are not currently provided
Acceptable	Community support	Community is likely to support the option/s		FAIL	· While this is an often suggested as a suitable water supply strategy, the loss of significant vegetation may be a significant community issue

Option 2 – Raising Rocky Creek Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	PASS		· This option is compatible with demand management strategies, since it will provide a modest increase in yield and therefore could be one of the building blocks for the future water supply strategy. However, unlike other options, it cannot be developed in stages/modules.
	Physical integration	Option matched to existing and future infrastructure needs	PASS		· This option can be readily matched to existing infrastructure since it would utilise the existing water treatment plant which serves all Rous Water consumers. This option can also be allowed for in the future duplication of the Nightcap to St Helena transfer main
Achievable	Legally achievable	Option is achievable under existing legislation		FAIL	· Highly unlikely to be approved by NPWS since NPWS cannot consent to any work that is detrimental to a national park
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	PASS		· While this would be a complex and costly exercise, this option is technically achievable. Other similar examples include Hinze Dam and the proposed raising of Clarrie Hall Dam.
	Built environment	Option can be practically incorporated into existing or future built environment	PASS		· Yes
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	PASS		· While this project would have a relatively long lead time of at least 8 years, it can be delivered within and appropriate timeframe
Draft Conclusion		· Because NPWS is likely to oppose this proposal and because of the environmental impacts associated with extensive removal of endangered ecological communities, this project is not recommended for further consideration. This is particularly so given that while the project is a major undertaking, it can only provide a very low increase in yield.			

Water Option 3	Description	Notes
Desalination	*Desalination of sea water or saline groundwater to provide significant amounts of water to one of the region's major urban areas. Could easily be staged in modules with capacities of say 1,000ML/annum and augmented as required.*	

Option 3 – Desalination					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use	PASS		· Can be safe and fit for purpose - precedent has been set in Australia.
Reliable	Measurable benefit	Option provides a measurable benefit to water security	PASS		· Can provide measureable benefit - preliminary studies indicate that it can be developed to provide significant yield.
	Availability	Option provides benefits when required	PASS		· The treatment process units can be built as modules thereby allowing flexibility in staging to match variation in demands. · This source is virtually limitless and permanent, and because of the nature of the process it would be preferable to operate the plant continuously 24/7
Sustainable	Principles	Option compatible with principles of sustainable development · Energy · Waste stream · Local environment · Non-renewable resources · Carbon footprint · $ not considered	PASS		· Energy embodied in the construction of the treatment plant would be modest. Ongoing energy usage for this type of treatment is high but potentially can be offset by employing renewable resources with the cost of doing so being a further consideration in detailed analysis. · While most of the water is recycled, there remains a waste stream in the form of a concentrated liquid brine – this can be managed. · A significant amount of non-renewable resources required for the construction of the treatment plant.

Option 3 – Desalination					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
					· Carbon footprint is relatively high for the construction of the treatment plant and for the ongoing operations and maintenance of the treatment process. · The positioning of the plant and location of the pipework is flexible so local environmental impacts can be minimal. While the well head installation work can disturb the coastal environment, that can be relatively easily restored.
Acceptable	Community support	Community is likely to support the option/s	PASS		· This technology has been implemented elsewhere in Australia. · Likely to gain community acceptance provided there is due consideration of all issues and it can be demonstrated that it is an appropriate response to meeting the community's needs.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	PASS		· Modular, therefore allowing flexibility in staging to match variation in demands.
	Physical integration	Option matched to existing and future infrastructure needs	PASS		· Easily integrated since the infrastructure would be located on the coast where future infrastructure needs are likely to be the highest. Also can be readily piped into the existing distribution system.
Achievable	Legally achievable	Option is achievable under existing legislation	PASS		· This technology is legally achievable as evident by precedents set throughout Australia, including NSW.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	PASS		· It is technically achievable as shown in several locations in Australia.
	Built environment	Option can be practically incorporated into existing or future built environment	PASS		· It can be integrated into the built environment, provided it is sensitively located and appropriately designed.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	PASS		· This option is deliverable within an appropriate timeline.

Option 3 – Desalination					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Draft Conclusion		· This option is considered suitable for further consideration. Energy usage and the sensitivity of the location are significant issues that will need to be addressed.			

Water Option 4	Description	Notes
Groundwater	*This could be achieved by developing a number of bore fields within the region each with a capacity of up to 2,000ML/annum. Each bore field could be staged in modules of say 1,000ML/annum and augmented as required.*	

Option 4 – Groundwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use	PASS		· Can be safe and fit for purpose. The raw water may need to be subject to some minor levels of treatment to remove iron and/or adjust the pH.
Reliable	Measurable benefit	Option provides a measurable benefit to water security	PASS		· Can provide measureable benefit - could be developed in modules, each providing capacities in the order of 2,000 ML per annum.
	Availability	Option provides benefits when required	PASS		· Can be built as modules thereby allowing flexibility in staging to match variation in demands. · Can be easily turned off without impacting on water quality or other issues. · Groundwater yields are not so affected during droughts in comparison with conventional surface water sources
Sustainable	Principles	Option compatible with principles of sustainable development · Energy · Waste stream · Local environment · Non-renewable resources · Carbon footprint · $ not considered	PASS		· Depending on location and pumping requirements the ongoing energy usage for treatment and pumping has the potential to be low. Energy embodied in the construction will also be low. · Waste stream is likely to be minimal. · Non-renewable resources - due to the modest level of infrastructure required and the potential to utilise existing pipe network, the use of non-renewable resources will be minimal.

Option 4 – Groundwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
					· Carbon footprint - potential to be low, depending on location and pumping requirements. Carbon footprint is likely to be low. · Local environment – the most significant issue will be the potential for competition with other groundwater users including groundwater dependent ecosystems. NSW Office of Water licensing requirements deal explicitly with these issues. · Much of the infrastructure will be below ground
Acceptable	Community support	Community is likely to support the option/s	PASS		· Irrigators and other users would need to be considered and consulted. · The Coal Seam Gas (CSG) issue has resulted in an increased interest in protecting the resource.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	PASS		· The individual borefields would be developed as a battery of bores, thereby allowing flexibility in staging to match variations in demands.
	Physical integration	Option matched to existing and future infrastructure needs	PASS		· Easily integrated since the infrastructure would be located on the coast and/or inland areas where future infrastructure needs are likely to be the highest. Also can be readily piped into the existing distribution system.
Achievable	Legally achievable	Option is achievable under existing legislation	PASS		· Office of Water is the primary consent authority. Approvals and licensing process is well-defined and town water supply has special status.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	PASS		· Groundwater is commonly used in Australia and overseas for town water supply purposes.
	Built environment	Option can be practically incorporated into existing or future built environment	PASS		· It can be integrated into the built environment, provided it is sensitively located and appropriately designed.

Option 4 – Groundwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	PASS		· This option is easily deliverable within an appropriate timeline.
Draft Conclusion		· This option is considered to be suitable for further consideration. The rights of other irrigators and groundwater dependent ecosystems are likely to be key issues.			

Water Source Option 5	Description	Notes
Urban Stormwater for Urban Irrigation	This option entails collection and storage of urban stormwater runoff, followed by treatment and irrigation of the treated water onto open space areas	This is a decentralised option that could be used as a means of substituting potable water use. Because of the risk of human contact during irrigation, the water requires treatment and disinfection to provide safe end use. In order to reduce the demand for potable water and thus be considered under this strategy, this option would need to be applied as a retrofit to an existing irrigation system that presently uses potable water or it would need to be used as an alternative for a future proposed open space irrigation project. While there are sporting fields at Evans Head, Lennox Head and Lismore that are presently irrigated with town water, the amounts of water used are relatively small - typically less than 0.5ML/annum for a typical football field. The main challenges associated with this option relate to finding a site that both provides sufficient catchment area and storage capacity (at least 1Megalitre for a typical football field) and is suitable in respect of technical and environmental considerations.

Option 5 – Urban Stormwater Irrigation					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use (non potable)	Pass		Can be safe and fit for purpose - precedent has been set in other parts of Australia e.g. Taronga Zoo and Bexley Golf Course stormwater harvesting projects..
Reliable	Measurable benefit	Option provides a measurable benefit to water security		Possible Fail	This option is considered unlikely to provide significant improvement in water security since at present there is only a relatively small amount (estimated to be significantly less than 10ML p.a.) of town water being used for urban irrigation.

Option 5 – Urban Stormwater Irrigation					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Availability	Option provides benefits when required	Pass		Yes, the limited benefits can be provided when required but only with provision of adequate water storage capacity (at least 1Megalitre for a typical football field).
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· Depending on location, pumping requirements and end use, the ongoing energy usage for treatment and pumping has the potential to be relatively low. Depending on the required size and format of the storage facilities, energy embodied in the construction would also be low. · Waste stream is likely to be minimal. · Non-renewable resources - due to the modest level of infrastructure required, the use of non-renewable resources will be minimal. · Carbon footprint - potential to be low, depending on location and pumping requirements. · Local environment – the most significant issue will be the size and format of the storage facility. Above or below ground tanks are often used. Otherwise. much of the infrastructure would be below ground.
Acceptable	Community support	Community is likely to support the option/s	Pass		There is unlikely to be any significant community opposition to this type of system.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		Yes, by utilising stormwater as a substitute for town water, this option fits with demand management and water efficiency. It is also water sensitive in that it can provide other stormwater management benefits.

Option 5 – Urban Stormwater Irrigation					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Physical integration	Option matched to existing and future infrastructure needs	Pass		Yes, this option can be matched to existing and future infrastructure, since it would service a specific site and would not have to connect to Rous Water's existing or future system.
Achievable	Legally achievable	Option is achievable under existing legislation	Pass		Yes, *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* provide guidelines for the implementation and management of these types of schemes and State government agencies have adopted these guidelines. There are a number of similar schemes that have already been approved and are in operation within NSW.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		Yes, this option is technically achievable, subject to the ability to provide adequate storage on the site (the equivalent of at least 1ML for each irrigated hectare of land).
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		Yes, this option can be incorporated into the existing built environment but only on a limited number of sites and subject to the ability to provide adequate storage.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Pass		Yes this option could be delivered in a short timeframe, although there are presently very limited opportunities to implement this option.
Conclusion		While this option can provide only limited benefits, it is a strategy that could be adopted in some circumstances and there are examples of this approach being used elsewhere in Australia.			

Water Source Option 6	Description	Notes
Urban Stormwater for Non-potable urban use	This option would entail provision of a significant storage dam downstream of a new urban development area, with a dedicated treatment plant and a dedicated reticulation system to supply treated water for outside use and toilet flushing within the new urban development area	This is a decentralised option that could be used as a means of substituting potable water use. Because of the likelihood of human contact during its use, the water requires treatment and disinfection to provide safe end use. There are significant challenges associated with retrofitting new pipework to existing streets and modifying the plumbing within existing dwellings, hence this option would only be applied in greenfield developments. In the order of 1ML to 5ML of storage required to provide 1ML/annum of secure yield. Therefore one of the main issues associated with this option relates to finding a site that both provides sufficient catchment area and storage capacity and is suitable in respect of technical and environmental considerations.

Option 6 – Dual Reticulated Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use (non potable)	Pass		Can be safe and fit for purpose – although there are no known existing systems of this type in other parts of Australia. Presumably because of the significant storage capacity required.

Option 6 – Dual Reticulated Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Reliable	Measurable benefit	Option provides a measurable benefit to water security	Pass		Depending on the catchment size, a storage capacity of between 1000ML and 5000ML would be required to generate a secure yield of 1000ML/annum. (This would need to be tested using secure yield modelling on a case by case basis). Because there are no known urban catchments that could provide storage capacities of this magnitude, this option could only provide relatively small benefits to water security. Nevertheless, subject to the size of the catchment and storage capacity that can be provided, such a scheme could satisfy greater than 40% of household water use within the urban area supplied by the system. It should be noted that the net benefits of dual reticulation schemes need to be considered against existing BASIX benchmarks.
	Availability	Option provides benefits when required	Pass		Because this system would be implemented when new development occurs, it could provide the benefits when they are required. However because it requires provision of significant storage capacity (1ML/annum of secure yield would need in the order of 1 to 5 ML of storage) to store water for use during dry periods, this option will have limited application.

Option 6 – Dual Reticulated Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· The ongoing energy usage for treatment and pumping is likely to be moderate. Due to the significant size of the storage facility and the need for a second water reticulation system, energy embodied in the construction will be significant. · Waste stream is likely to be minimal. · Non-renewable resources - due to the need to construct a new dam and dedicated reticulation system the use of non-renewable resources will be significant. · Carbon footprint - due to the significant level of infrastructure required and moderate level of ongoing energy demand, the carbon footprint is likely to be moderate. · Local environment – the most significant issue will be the size and format of the storage facility. This could be a significant impediment to the practical implementation of this option.
Acceptable	Community support	Community is likely to support the option/s	Pass		Given that dual water supply systems have been implemented elsewhere in Australia (but using recycled sewage not stormwater) the community is likely support this option providing the storage facility can be sensitively located.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		Yes, by utilising stormwater as a substitute for town water, this option fits with demand management and water efficiency. It is also water sensitive in that it can provide other stormwater management benefits.

Option 6 – Dual Reticulated Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Physical integration	Option matched to existing and future infrastructure needs	Pass		This option can be matched to both existing and future infrastructure needs. However due to the high cost of retrofitting pipework to existing development, this option is more suited to "greenfield" sites. The storage facility would most likely need to be fully constructed at the commencement of development of the "greenfield" site, however the associated reticulation system could be built as required to meet demand for new lots.
Achievable	Legally achievable	Option is achievable under existing legislation	Pass		*Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* provides guidelines for the implementation and management of these types of schemes and State government agencies have adopted these guidelines. However, there are no similar schemes that have been implemented within Australia to date.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		Even though there are no existing examples, this option is technically feasible.
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		As noted above, this option is better suited to ""greenfield" development but only where there adequate space to provide the required water storage capacity.

Option 6 – Dual Reticulated Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Pass		It could be delivered quickly if land that includes a suitable site for a storage dam is developed for urban purposes.
Conclusion		This option passes the coarse screening assessment. It should be noted however that it is unlikely in the foreseeable future that there will be any greenfield development sites that are suitable especially given that future development sites such as Ballina Heights are already committed to installing a dual water supply system to recycle reclaimed water (a strategy which provides a climate independent source).			

Water Source Option 7	Description	Notes
Potable Use of Urban Stormwater	This option would entail harvesting urban stormwater runoff by providing a significant storage dam downstream of an urban development area. The collected water would then be pumped via a new dedicated pipeline to an existing water treatment plant (e.g. Nightcap WTP or Emigrant Creek WTP) for subsequent supply to consumers. In this way the stormwater would be used to supplement Rous Water's existing raw water sources (e.g. Rocky Creek Dam, Emigrant Creek Dam and the Wilson River Source)	This would provide a new water source based on an urban catchment rather than the traditional rural/forested catchment. Because the water would be used for human consumption, the catchment and storage facility would need to be well managed and additional treatment may be required to provide safe end use. In the order of 1ML to 5ML of storage would be required to provide 1ML/annum of secure yield. Therefore one of the main challenges associated with this option relates to finding a site that both provides sufficient catchment area and storage capacity and is suitable in respect of technical and environmental considerations. Depending on the location of the new dam, this option could also require significant pumping and pipeline infrastructure.

Option 7 – Potable Use of Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use (potable)	Pass		A somewhat similar system involving indirect stormwater use whereby stormwater is pumped into an existing water supply dam has been installed at Orange. The treatment technology is available to ensure the treated water is safe for potable use. In addition, the dam would need to be well managed. There would need to be strict controls on land use activities and wastewater management within the catchment area, as well as intensive monitoring of the whole system.

Option 7 – Potable Use of Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Reliable	Measurable benefit	Option provides a measurable benefit to water security	Pass		Depending on the catchment size, a storage capacity of between 1000ML and 5000ML would be required to generate a secure yield of 1000ML/annum. (This would need to be tested using secure yield modelling on a case by case basis). Because there are no known urban catchments that could provide storage capacities of this magnitude, this option could realistically provide relatively only small benefits to water security.
	Availability	Option provides benefits when required	Pass		Provided a suitable size storage dam could be provided at the base of a suitably sized urban catchment, this option would provide the benefits when they are required.

Option 7 – Potable Use of Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· The ongoing energy usage for pumping is likely to be relatively high. Due to the significant size of the storage facility and the need for a reasonably long pumping main, energy embodied in the construction will also be significant. · Waste stream is likely to be minimal. · Non-renewable resources - due to the significant level of infrastructure required, the use of non-renewable resources will be significant. · Carbon footprint - due to the significant level of infrastructure required and moderate low level of ongoing energy demand, the carbon footprint is likely to be high. · Local environment – the most significant issue will be the size and format of the storage facility. This could be a significant impediment to the practical implementation of this option.
Acceptable	Community support	Community is likely to support the option/s	Pass		This option is expected to enjoy a reasonable level of community support providing the storage facility can be sensitively located and land use restrictions within the catchment are not too onerous.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		Contemporary demand management initiatives can still be applied and this option reduces the demand for the other potable water sources - this option is therefore compatible with demand management principles and efficient water use.

Option 7 – Potable Use of Urban Stormwater					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Physical integration	Option matched to existing and future infrastructure needs	Pass		Subject to finding a suitable dam site, this option can be matched to existing and future water infrastructure needs.
Achievable	Legally achievable	Option is achievable under existing legislation	Pass		*Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* provides guidelines for the implementation and management of these types of schemes and State government agencies have adopted these guidelines. Implementation of indirect potable use of stormwater at Orange indicates that this type of system is likely to be legally achievable.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		This option is technically achievable.
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		This option can be incorporated into the existing built environment subject to finding a suitable catchment and dam site.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Pass		Yes – subject to finding a site that provides sufficient catchment and storage capacity this option could be implemented in an appropriate timeframe.
Conclusion		Subject to finding a site that would provide sufficient catchment and storage capacity and is appropriate in respect of technical and environmental issues, this option is considered suitable for further consideration.			

Water Source Option 8	Description	Notes
Indirect Potable Reuse	This involves provision of a sophisticated treatment process, pumping station and transfer pipeline to deliver highly treated reclaimed water directly into an existing major storage dam (e.g. Rocky Creek Dam or Emigrant Creek Dam) or possibly a groundwater source, for subsequent extraction, treatment and transfer using existing infrastructure	By using reclaimed water from an urban wastewater treatment plant, this option can provide a new water source that is always available even in drought conditions. Because the water would be used for human consumption, a multi-barrier approach to public health risk management will be necessary. A complex treatment process (possibly including filtration, microfiltration, reverse osmosis, ozonation, and UV disinfection) is thus required. The wastewater system would also need to be well managed; a very high level of monitoring would be required; and extended detention within the storage dam will need to occur. There are significant distances between the existing storage dams and the existing wastewater treatment plant, so this option would involve considerable pumping and pipeline infrastructure.

Option 8 – Indirect Potable Reuse					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use (potable)	Pass		Even though there are currently no formal examples of this type of system presently operating within Australia this option could be safe and fit for purpose.
Reliable	Measurable benefit	Option provides a measurable benefit to water security	Pass		This type of system can provide significant measurable benefit since it can utilise the significant and consistent flows from major sewage treatment plants.
	Availability	Option provides benefits when required	Pass		Yes it can provide the benefits when required since the source water is always available, even during a drought.

Option 8 – Indirect Potable Reuse					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· Energy embodied in the construction of the treatment plant and transfer system would be high. Ongoing energy usage for this type of treatment and pumping arrangement is also high. · While most of the water is recycled, there remains a sludge waste stream that will require dewatering and solids disposal. · A significant amount of non-renewable resources required for the construction of the treatment plant and transfer system. · Carbon footprint is moderately high for the construction and operation of the treatment plant and the transfer system. · Local environment – plant could be co-located with a sewage treatment plant (STP) and within its associated buffer area, therefore local environmental impacts would be minimal. The route for the transfer system would need to be selected taking account of environmental considerations.
Acceptable	Community support	Community is likely to support the option/s	Uncertain Pass		Even though this outcome already happens unintentionally in a number of locations within Australia (i.e. the Wilson River intake is downstream of Bangalow's Wastewater Treatment Plant), based on recent history at Toowoomba and the western corridor in SE Queensland, the deliberate implementation of this option would struggle to gain community support in the near future.

Option 8 – Indirect Potable Reuse					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		Contemporary demand management initiatives can still be applied and this option reduces the demand for the other raw water sources - this option is therefore compatible with demand management principles and efficient water use.
	Physical integration	Option matched to existing and future infrastructure needs	Pass		The treatment system and the pumping station could be developed in stages to match the increasing demand. However due to the long length of the transfer main and the high cost of trenching and backfilling, staging of the pipeline is unlikely to be a feasible proposition.
Achievable	Legally achievable	Option is achievable under existing legislation	Uncertain Pass		*Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* provides guidelines for the implementation and management of these types of schemes and State government agencies have adopted these guidelines. However, there is conflicting advice from the Ministry of Health as to whether that authority would approve this type of scheme.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		Yes – this option is technically feasible and already happens unintentionally in a number of locations within Australia
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		Yes subject to the sensitive placement of infrastructure.

Option 8 – Indirect Potable Reuse					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Uncertain Pass		While the infrastructure required for this option could be developed in stages to match the increase in the demand for water, community opposition could stall the implementation of this option.
Conclusion		While *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* provides guidelines for the implementation and management of these types of schemes, it is unclear at this stage whether this option would be supported by the NSW Ministry of Health. While recent experience elsewhere in Australia indicates that this option may not gain community support, in recognition of the trend of increasing community understanding of water treatment technology and water cycle management principles, this option cannot be discounted at this stage. It is therefore recommended that indirect potable reuse be subject to further consideration.			

Water Source Option 9	Description	Notes
Recycling of Reclaimed Water for Non Potable Urban Use	This involves provision of further treatment of reclaimed water produced by a sewage treatment plant, and provision of a pumping station, transfer pipeline and dedicated reticulation system to deliver treated reclaimed water for outside use and toilet flushing within new urban development areas	This option entails the use of reclaimed water from an urban wastewater treatment plant as a substitute for potable water. Because of the likelihood of human contact during its use, the water requires additional treatment and disinfection to provide safe end use. This option offers a supply that is always available even during a drought. Because of the difficulties associated with retrofitting new pipework to existing streets and modifying the plumbing within existing dwellings, this option would only be applied in greenfield developments.

Option 9 – Recycling of Reclaimed Water for Non Potable Urban Use					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use (non potable)	Pass		Can be safe and fit for purpose – in addition to the systems that exist in other parts of Australia (e.g. Rouse Hill, Homebush and Gold Coast), a dual water supply system is currently being implemented at Ballina Heights. However to minimise public health risks, this type of system requires intensive management and monitoring.
Reliable	Measurable benefit	Option provides a measurable benefit to water security	Pass		Yes, since it could satisfy more than 40% of household water use within the urban area supplied by the system. However the net benefits of dual reticulation schemes need to be considered against existing BASIX benchmarks.

Option 9 – Recycling of Reclaimed Water for Non Potable Urban Use					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Availability	Option provides benefits when required	Pass		Because this system would be implemented when new development occurs, it could provide the benefits when they are required. Wastewater reuse schemes are climate independent and thus provide continuous potable water savings regardless of rainfall.
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· The ongoing energy usage for treatment and pumping is likely to be relatively low. Due to the need for a second water reticulation system, energy embodied in the construction will be moderate. · Waste stream is likely to be minimal. · Non-renewable resources - due to the significant level of infrastructure required, the use of non-renewable resources will be significant. · Carbon footprint - due to the significant level of infrastructure required and relatively low level of ongoing energy demand, the carbon footprint is likely to be moderate. · Local environment – the treatment plant would be co-located with the wastewater treatment plant and experience has shown that this type of system can be implemented with minimal impact on the local environment.
Acceptable	Community support	Community is likely to support the option/s	Pass		Given that dual water supply systems have been implemented elsewhere in Australia and one is presently being established at Ballina Heights, the community is likely support this option.

Option 9 – Recycling of Reclaimed Water for Non Potable Urban Use					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		By utilising reclaimed water as a substitute for town water, this option fits with demand management and water efficiency. Traditional demand management initiatives can also be applied to this type of system. It is also water sensitive in that it can provide wastewater management benefits.
	Physical integration	Option matched to existing and future infrastructure needs	Pass		This option is well matched to both existing and future infrastructure needs. However due to the high cost of retrofitting pipework to existing development and existing housing, this option is more suited to "Greenfield" sites. Both the additional treatment facilities and the associated reticulation system within the "Greenfield" development could be staged and built as required to meet demand for new lots.
Achievable	Legally achievable	Option is achievable under existing legislation	Pass		Yes, *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* provide guidelines for the implementation and management of these types of schemes and State government agencies have adopted these guidelines. There are a number of similar schemes that are approved and operating within NSW. Also this type of scheme is now being implemented at Ballina Heights.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		Yes, as demonstrated by the existing examples within Australia, this option is technically feasible.

Option 9 – Recycling of Reclaimed Water for Non Potable Urban Use					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		As noted above, this option is better suited to future "Greenfield" development.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Pass		It could be delivered relatively quickly in conjunction with suitable urban developments.
Conclusion		The option of developing dual water supply schemes for the recycling of reclaimed water for non potable use passes all of the assessment criteria. There are a number of similar schemes that are approved and operating within NSW and this type of scheme is now being implemented at Ballina Heights. Because there is scope for further application within the Rous Water supply area, this option is worthy of further consideration.			

Water Source Option 10	Description	Notes
Regional connections – Casino / Rous Water	This option involves the interconnection of the Rous Water supply with the Casino water supply sourced from Jabour Weir.	The Rous Water and Casino water supplies would be interconnected by a single water main so that treated water could be directed from either Rous Water to Casino or vice versa, depending upon need. The system would potentially involve some upgrades to existing water treatment plants and would require some pumping of water. Under usual condition waters would be sourced from the existing water supplies. Available water would be transferred during dry weather to preserve the volume of water retained within Rocky Creek Dam. Alternatively water may be transferred to Casino if local supplies are insufficient to meet demand.

Option 10 – Regional Connections – Casino / Rous Water					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use	Pass		The water would be treated to appropriate potable standards at the Casino Water Treatment Plant.
Reliable	Measurable benefit	Option provides a measurable benefit to water security		Fail	This option is considered unlikely to provide significant improvement in water security. Hydrological modelling suggests that linking the systems would provide approximately 160 ML/a (1.1%) additional secure yield
	Availability	Option provides benefits when required		Fail	Hydrological modelling results indicate that additional water may not be available when needed, and may be diverted out of the existing Rous Supply during periods of extended drought

Option 10 – Regional Connections – Casino / Rous Water					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· Water treatment and pumping requirements have the potential to be relatively low. Energy embodied in the construction would also be low. · Waste stream is likely to be low. · Non-renewable resources - due to the modest level of infrastructure required, the use of non-renewable resources will be minimal. · Carbon footprint – likely to be low, depending on location and pumping requirements. · Local environment –Infrastructure would be below ground or at existing sites.
Acceptable	Community support	Community is likely to support the option/s	Pass		There is unlikely to be any significant community opposition to this proposal.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		Yes, additional water would only be accessed when required, thus integrating with the principles of demand management.
	Physical integration	Option matched to existing and future infrastructure needs	Pass		Yes, this option can be matched to existing and future infrastructure, since it would potentially be able to service all of Rous Water's and RVC's existing or future system.
Achievable	Legally achievable	Option is achievable under existing legislation	Pass		Yes, such schemes are achievable under existing legislation
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		Yes, this option is technically achievable.

Option 10 – Regional Connections – Casino / Rous Water					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		Yes, this option can be incorporated into the existing built environment.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Pass		Yes this option could be delivered in an appropriate timeframe.
Conclusion		This option fails to pass the assessment as it does not provide a significant increase in water security for the Rous Water supply.			

Water Source Option 11	Description	Notes
Regional Connections – Purchase existing entitlements for Toonumbar Dam	This option involves accessing existing water entitlements within the Toonumbar regulated water source. Water would be transferred to the Casino Water Treatment Plant for treatment to potable standards and then pumped into the Rous Water supply	Advice from the NSW Office of water indicates that it is not possible to convert existing water entitlements to Town Water Supply under the existing Water Sharing Plan for the Richmond River. Accordingly, although Rous Water may be able to buy existing licences, these would not provide the level of security provided by a Town Water Supply licences.

Option 11 – Regional Connections – Purchase existing entitlements for Toonumbar Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use	Pass		The water would be treated to appropriate potable standards at the Casino Water Treatment Plant.
Reliable	Measurable benefit	Option provides a measurable benefit to water security	Likely Pass		Rous Water would purchase existing water entitlements via the water trading market facilitated under the Water Management Act 2000. Although entitlements are fully allocated, recent experience indicates that water resources within the Toonumbar regulated water source are underutilised by existing licence holders. Accordingly, it is considered likely that Rous Water would, in time, be able to purchase sufficient entitlements to provide a measureable benefit to water security.
	Availability	Option provides benefits when required		Fail	The inability to convert existing water licences to Town Water Supply licences significantly reduces the security of supply from Toonumbar Dam. Under drought conditions access to water would not be ensured.

Option 11 – Regional Connections – Purchase existing entitlements for Toonumbar Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· Water treatment and pumping requirements have the potential to be relatively low. Energy embodied in the construction would also be low. · Waste stream is likely to be low. · Non-renewable resources - due to the modest level of infrastructure required, the use of non-renewable resources will be minimal. · Carbon footprint – likely to be low, depending on location and pumping requirements. · Local environment –Infrastructure would be below ground or at existing sites.
Acceptable	Community support	Community is likely to support the option/s	Pass		There is unlikely to be any significant broader community opposition to this proposal. However, there may be local opposition among water users within the Toonumbar Regulated Water Source.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		Yes, water would only be accessed when required, thus integrating with the principles of demand management.
	Physical integration	Option matched to existing and future infrastructure needs	Pass		Yes, this option can be matched to existing and future infrastructure, since it would potentially be able to service all of Rous Water's and RVC's existing or future system.
Achievable	Legally achievable	Option is achievable under existing legislation		Fail	It is not possible to convert existing entitlements to Town Water Supply entitlements under the Water Sharing Plan for the Richmond River

Option 11 – Regional Connections – Purchase existing entitlements for Toonumbar Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		Yes, this option is technically achievable.
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		Yes, this option can be incorporated into the existing built environment.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Pass		Yes this option could be delivered in an appropriate timeframe.
Conclusion		This option fails to pass the assessment as it does not provide sufficient water security during periods of low water avialability			

Water Source Option 12	Description	Notes
Regional Connections – Establish new Town Water Supply licence for Toonumbar Dam	This option involves a new Town Water Supply licence within the Toonumbar regulated water source. Water would be transferred to the Casino Water Treatment Plant for treatment to potable standards and then pumped into the Rous Water supply	Advice from the NSW Office of water indicates that Rous Water may apply for a new TWS licence within the Toonumbar regulated water source if it is able to demonstrate subject to demonstrating that there is no adverse impacts to the existing levels of performance of the supply or to its licence holders. To achieve this, it is likely that Rous Water would need to purchase and retire an appropriate amount of existing water entitlements from within the Toonumbar Regulated Water Source.

Option 12 – Regional Connections – Establish new Town Water Supply Licence for Toonumbar Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Healthy	Safe / Fit for purpose	Option is safe and fit for its intended use	Pass		The water would be treated to appropriate potable standards at the Casino Water Treatment Plant.
Reliable	Measurable benefit	Option provides a measurable benefit to water security	Likely Pass		This option would provide a measurable benefit to water security provided that Rous Water is able to purchase an appropriate amount of existing water entitlement from existing water users within the Toonumbar Regulated Water Source under the water trading provisions of the Water Management Act, 2000
	Availability	Option provides benefits when required	Pass		A new Town Water Supply licence provides high security access to the Toonumbar water source, which in turn is considered to be highly reliable.

Option 12 – Regional Connections – Establish new Town Water Supply Licence for Toonumbar Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Sustainable	Principles	Option compatible with principles of sustainable development	Pass		· Water treatment and pumping requirements have the potential to be relatively low. Energy embodied in the construction would also be low. · Waste stream is likely to be low. · Non-renewable resources - due to the modest level of infrastructure required, the use of non-renewable resources will be minimal. · Carbon footprint – likely to be low, depending on location and pumping requirements. · Local environment –Infrastructure would be below ground or at existing sites.
Acceptable	Community support	Community is likely to support the option/s	Likely Pass		There is unlikely to be any significant broader community opposition to this proposal. However, there may be local opposition among water users within the Toonumbar Regulated Water Source from whom Rous Water will likely need to purchase existing water entitlements to offset the impact of the Town Water Licence.
Integrated	Water sensitive	Option is compatible with demand management principles and efficient water use	Pass		Yes, water would only be accessed when required, thus integrating with the principles of demand management.
	Physical integration	Option matched to existing and future infrastructure needs	Pass		Yes, this option can be matched to existing and future infrastructure, since it would potentially be able to service all of Rous Water's and RVC's existing or future system.

Option 12 – Regional Connections – Establish new Town Water Supply Licence for Toonumbar Dam					
Criteria	*Measure*	*Objective*	*Scoring*		*Justification / Comment*
			Pass	Fail	
Achievable	Legally achievable	Option is achievable under existing legislation	Pass		New Town Water Supply licences are permitted in the Toonumbar regulated water source under the current Water Sharing Plan.
	Practically viable	Option is technically achievable utilising existing knowledge and capabilities	Pass		Yes, this option is technically achievable.
	Built environment	Option can be practically incorporated into existing or future built environment	Pass		Yes, this option can be incorporated into the existing built environment.
	Timeliness	Option can be delivered in an appropriate timeframe to achieve its expected outcomes	Pass		Yes this option could be delivered in an appropriate timeframe.
Conclusion		This option passes the assessment, provided that the Licence conditions of the NSW Office of Water can be met.			