COUNCIL MEETING AGENDA

Date	**Wednesday,17 June 2020**
Venue	Rous County Council Administration Office (Level 4) 218-232 Molesworth Street, Lismore
Lunch	12.30pm
Meeting	1.00pm

AGENDA

1. Opening of the meeting

2. Acknowledgement of Country

Council would like to show its respect and acknowledge the Traditional Custodians of the Land, of Elders past and present on which this meeting takes place.

3. Public Access

4. Apologies and Leave of Absence

5. Confirmation of minutes of previous meetings

i). Ordinary Council meeting 15 April 2020 1-5

6. Disclosure of Interest

7. General Manager reports

i). Adoption of the draft Future Water Project 2060 Integrated Water Cycle Management Plan for public exhibition.....6-119

8. Group Manager Corporate and Commercial reports

i). Draft Delivery program / Operational plan and 2020/21 Budget.....120-180

ii). Water usage charges write-off.....181-182

iii). Retail water customer account assistance.....183-184

9. Group Manager Planning reports

i). Rous County Council's draft Catchment Management Plan 2020-25 185-291

ii). Deferral and refund of developer contributions – Byron Bay Preschool 292-298

10. Policies

i). Public Interest Disclosures policy - amendment 299-323

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i). Investments - May 2020 325-331

ii). Water production and usage - April 2020 and May 2020 332-339

iii). Audit, Risk and Improvement Committee - 25 May 2020 meeting update 340-346

iv). Reports pending 347-348

12. Matter of urgency

13. Questions on Notice

14. Close of business

Phillip Rudd
General Manager

Rous County Council

MINUTES OF ORDINARY COUNCIL MEETING

15 April 2020

1. OPENING OF THE MEETING

Meeting commenced at 1.06pm

In attendance:

Councillors *(at Admin. Office)*

Keith Williams (Chair) and Sharon Cadwallader (Deputy Chair).

Councillors *(via video conferencing)*

Darlene Cook, Vanessa Ekins, Sandra Humphrys, Robert Mustow and Simon Richardson.

Staff *(at Admin. Office)*

Phillip Rudd (General Manager) and Noeline Smith (minute taker).

Staff *(via video conferencing)*

Guy Bezrouchko (Group Manager Corporate and Commercial), Andrew Logan (Planning Manager), Khaila-Rose Prior (Acting Group Manager People and Performance) and Natalie Woodhead-Tiernan (Finance Manager).

2. ACKNOWLEDGEMENT OF COUNTRY

Council showed its respect and acknowledged the Traditional Custodians of the Land, of all Elders, on which this meeting took place.

3. PUBLIC ACCESS

Nil.

4. APOLOGIES AND LEAVE OF ABSENCE

RESOVLED [11/20] (Cadwallader/Mustow) that an apology be received and accepted for Cr Basil Cameron.

5. CONFIRMATION OF MINUTES

i). Ordinary Council meeting 19 February 2020 (182)

RESOLVED [12/20] (Cadwallader/Cook) that the minutes of the ordinary meeting held 19 February 2020 be confirmed as presented.

6. DISCLOSURE OF INTEREST

Cr Cook and Cr Ekins declared a non-pecuniary, significant interest in relation to *Confidential report Item 11. i) Financial assistance for pensioners – section 582.*

7. GENERAL MANAGER REPORTS

Nil.

8. GROUP MANAGER CORPORATE AND COMMERCIAL REPORTS

i). Draft Delivery program / Operational plan and 2020/21 Budget

RESOLVED [13/20] (Cadwallader/Mustow) that Council:

1. Approve the draft Delivery program / Operational plan and 'Revenue' policy attached to this report, for public exhibition.
2. Note that adjustments approved at this meeting as part of the March Quarterly Budget Review Statement report will be included in the exhibited document as appropriate.
3. At its June 2020 meeting:
    a) Receive for information, public submissions (if any) lodged during the public consultation process and information about how the submissions have been considered.
    b) Receive for adoption the final draft Delivery program / Operational plan.

ii). Quarterly Budget Review Statement for the quarter ending 31 March 2020

RESOLVED [14/20] (Cadwallader/Cook) that Council note the results presented in the Quarterly Budget Review Statement as at 31 March 2020 and authorise the variations to the amounts from those previously estimated.

TABLED REPORT

iii). Commercial rental properties – (COVID-19) Mandatory Code

RESOLVED [15/20] (Cadwallader/Cook) that Council:

1. Receive and note the report.
2. Resolves, that in response to the COVID-19 pandemic, that any requests for financial relief by commercial tenants of Council-owned and managed properties be managed in accordance with the (yet to be enacted) NSW Government scheme, which gives effect to the National Cabinet Mandatory Code of Conduct:
    a. For the financial period up until 30 June 2020, via report to Council for determination, with 28 days public notice; and
    b. For the financial period from 1 July 2020, via report to Council for determination, by inclusion of the program in Council's draft 'Revenue' policy presently before Council, thereby dispensing with the requirement for public notice.
3. Resolves, that any reports requesting financial relief by commercial tenants be received in closed meeting as the requests will include commercial information of a confidential nature (i.e. business turnover) that if disclosed, prejudice the commercial position of the tenant who supplied the information.

9. POLICIES

i). Debt management and financial hardship (172/19)

RESOLVED [16/20] (Cadwallader/Mustow) that Council:

1. Note the draft 'Debt management and financial hardship' policy attached to the report and:
    a. Approve public exhibition of the draft policy for a period of 28 days where submissions from the public are invited;
    b. If no submissions are received or only submissions regarding minor or inconsequential matters are received during the public exhibition period, that the 'Debt management and financial hardship' policy be adopted effective the day after the conclusion of the public exhibition period;
    c. If submissions are received during the public exhibition period that are not of a minor or inconsequential nature, a further report regarding those submissions and how they have been considered in relation to the draft policy be provided to Council for consideration;
    d. For the purposes of (b) and (c) above and determining whether a submission is minor or inconsequential the General Manager be authorised to make that assessment.
2. In response to the COVID-19 pandemic:
    a. Extend payment terms on all retail water accounts from 30 days to 60 days for the March/April 2020 and June/July 2020 billing cycles;
    b. Suspend debt recovery action until 30 June 2020 at which time the General Manager may review and approve a further extension period or recommencement of such action.

ii). Public interest disclosures (172/19)

RESOLVED [17/20] (Mustow/Cadwallader) that Council:

1. Revoke the 'Public interest disclosures' policy, at Attachment 2 to the report, and any policy revived as a result of that revocation.
2. Adopt the draft 'Public interest disclosures' policy at Attachment 1 to the report.

iii). Investments policy (revised) (172/19)

RESOLVED [18/20] (Cadwallader/Cook) that Council note this report and re-adopt the existing 'Investments' policy without amendment.

10. INFORMATION REPORTS

i). Information reports (1181)

RESOLVED [19/20] (Mustow/Cadwallader) that Council receive and note the following information reports:

1. Investments – March 2020
2. Water production and usage – February 2020 and March 2020
3. Audit, Risk and Improvement Committee: meeting update
4. Fluoride plant dosing performance report: January to March 2020 - Q1
5. Reports/actions pending.

11. CONFIDENTIAL

MOVE INTO CLOSED COUNCIL

RESOLVED [20/20] (Cadwallader/Mustow) that Council move into Closed Council to consider the following matter and that members of the public and press be excluded from the meeting based on the grounds detailed below.

Voting against: Cr Ekins

Report	**Financial assistance for pensioners – section 582**
Grounds for closure	Section 10A(2)(b) the personal hardship of any resident or ratepayer.
Public interest	Public discussion would not be in the public interest due to disclosure of personal information.

Crs Ekins and Cook left the meeting at 2.20pm

RESUME TO OPEN COUNCIL

RESOLVED [21/20] (Cadwallader/Mustow) that Council resume to Open Council.

The General Manager read to the meeting the following resolution of Council:

i). Financial assistance for pensioners – section 582

RESOLVED [22/20] (Cadwallader/Mustow) that Council in accordance with section 582 of the *Local Government Act 1993* and its 'Retail Water Customer Account Assistance' policy, consider and approve the financial assistance as listed in Table 1 of the report, subject to receipt of a valid Water Use Audit Report.

12. MATTERS OF URGENCY

Nil.

13. QUESTIONS ON NOTICE

Nil.

14. CLOSE OF BUSINESS

There being no further business the meeting closed at 2.30pm

Adoption of the draft *Future Water Project 2060 Integrated Water Cycle Management Plan* for public exhibition

(1636)

Business activity priority	Strategy and planning
Goal 2	Align strategic direction to core functions and sustainability

Recommendation

That Council

1. Receive and note this report and the attached d*raft Future Water Project 2060 Integrated Water Cycle Management Plan.*
2. Approve the public exhibition of the *draft Future Water Project 2060 Integrated Water Cycle Management Plan* from 1 July 2020 for a period of six weeks.
3. Receive a further written report on the adoption of the *Future Water Project 2060 Integrated Water Cycle Management Plan* at its October 2020 meeting, including feedback received during the exhibition period.
4. Authorise the General Manager, as the first key action, to progress discussions with Ballina Shire Council, in relation to the Marom Creek WTP and associated groundwater infrastructure, including the approval of the associated budget as outlined in the report.
5. Authorise the General Manager to commence the development of the Woodburn coastal sands groundwater scheme as an alternative to Recommendation 4, if Council is unable to secure the Marom Creek WTP and associated groundwater infrastructure before 31 December 2020.
6. Authorise the General Manager, concurrent with Recommendation 4, to progress preliminary investigations in relation to the Dunoon Dam, including the approval for the allocation of a $100,000 operating budget.
7. Authorise the General Manager to progress discussions with the NSW Government and Southern Cross University in relation to the pilot recycled water supply scheme for Perradenya estate.
8. Amend Council's adopted 2020/21 Delivery Program / Operational Plan to reflect the specific actions identified in this report.

Background

In 2014, Council adopted its Future Water Strategy. Building upon the existing long-term water security strategy adopted by Council in 1995, the Future Water Strategy provided an updated plan to maintain a secure and sustainable water supply until at least 2060.

Information was brought together using an Integrated Water Planning Process, incorporating input from Council and stakeholders, to identify and analyse new water source options and to develop a strategy that minimised social, environmental and economic costs to the community, while meeting forecast demand.

To ensure long-term water supply security, the Future Water Strategy's key actions in relation to the timely development of new water sources included:

- Undertake detailed investigation to assess the suitability of increased use of groundwater as a new water source.

- Undertake detailed investigation and consultation to assess the suitability of water re-use as an additional new water source.
- Once further investigations into groundwater and water re-use are completed, determine whether to continue to maintain the Dunoon Dam proposal.

The proposed *Future Water Project 2060* is the outcome of all the new water source investigations undertaken by Council since the Future Water Strategy was adopted.

1. Proposed Future Water Project 2060

The proposed *Future Water Project 2060* sets out the most viable option for augmenting Council's bulk water supply to ensure it is secure, resilient in the face of changing climate conditions and able to sustain continued growth for at least the next 40 years.

The project's preferred option involves two key actions to secure the medium-to-long-term water supply:

- Utilisation of Marom Creek Water Treatment Plant
- Construction of the new 50 gigalitre Dunoon Dam

This option is based on the updated water demand forecast, new water source investigations and assessment of feasible actions (all outlined later in this Business Paper) completed by Council since the Future Water Strategy was adopted in 2014.

As a contingency, should utilisation of Marom Creek Water Treatment Plant not progress, it is recommended that the Woodburn groundwater coastal sand scheme be developed. The scheme consists of a new Water Treatment Plant along with new groundwater bores and associated interconnecting pipework. A concept scheme report has been completed as part of the 2014 Future Water Strategy groundwater investigations.

1.1 Utilisation of Marom Creek Water Treatment Plant

The proposed Marom Creek Water Treatment Plant Project has two stages.

Stage one involves an upgrade of the existing treatment plant to improve its performance, reliability and capacity.

Stage two involves augmentation of both Rous and Ballina Shire Council's existing groundwater bore network in the Alstonville/Wollongbar area and construction of associated pipeline to Marom Creek Water Treatment Plant.

1.2 Construction of the new 50 gigalitre Dunoon Dam

Based on a whole of life assessment the proposed Dunoon Dam project is the lowest cost option for securing Council's water supply to 2060 and beyond.

With a storage capacity of 50 gigalitres, the proposed Dunoon Dam's construction requirements will be significant. Ancillary works include 8 kilometres of water pipelines, 12 kilometres of road works, two new road bridges, a water pump station, on-site storage facilities, power upgrades and public recreation facilities such as walking tracks, picnic areas and amenities.

Around 50 per cent of the land within the Dunoon Dam footprint is currently owned by Council.

2. Updated Water Demand Forecast – key driver for *Future Water Project 2060*

Council last developed a long-term water supply demand forecast in 2013 as part of the Future Water Strategy, which predicted the demand for water by 2060 would be approximately 15.8 gigalitres per annum.

Council's regional bulk supply currently produces 11.3 gigalitres each year (five-year average) to service 41,868 connected residential properties and 5,114 connected non-residential properties (a total of 46,982 connections).

A revised demand forecast for Council's bulk supply area from 2020 to 2060 has now been completed as part of the development of the *Future Water Project 2060*.

By 2060, Council's regional bulk supply is predicted to service 57,561 connected residential properties and 9,361 connected non-residential properties (a total of 66,922 connections).

Based on these expected connections, the dry year demand for water at 2060 is predicted to be between 16.0 and 16.7 gigalitres per annum, an increase of approximately 5.0 gigalitres each year over current demand.

3. Outcome of investigations – FWS2014 to now

The following new water source options have been investigated since the Future Water Strategy was adopted:

- Groundwater
- Indirect potable re-use - wastewater
- Desalination
- Dunoon Dam

3.1 Groundwater

Council currently draws water from underground aquifers during periods of drought only.

Investigations into the increased use of groundwater as an additional primary water source identified the following four potential groundwater sites:

- Alstonville/Wollongbar
- Newrybar
- Tyagarah
- Woodburn

The findings of these investigations are summarised in Table 1 below.

Table 1: ***Potential Groundwater sites***

Groundwater site	Key benefits	Key issues
1. Alstonville/Wollongbar • Located over a fractured basalt aquifer	• Rous County and Ballina Shire councils have a number of under-utilised water extraction licences • Proximity to Ballina Shire Council's Marom Creek Water Treatment Plant	• New bores must be deep so as not to impact existing domestic and agricultural users, surface water and groundwater dependent ecosystems

Groundwater site	Key benefits	Key issues
		• Existing land uses and geology may pose water quality risks
2. Newrybar • Located west of Lennox Head over a coastal sand's aquifer	• Abundance of water	• Poor water quality • Costly, advanced water treatment system needed
3. Tyagarah • Located south of Brunswick over a coastal sand's aquifer	• Abundance of water • Pockets of good quality water • Located near Council's bulk water supply pipelines	• High land values. • Located near Groundwater dependant ecosystems • Existing land uses may pose water quality risks
4. Woodburn • Located east of Woodburn over a coastal sand's aquifer	• Good quality water • Previously used as part of Council's drought response plans • Existing licences held for the aquifer	• Low demand area • Existing land uses restrict water extraction

Overall, these investigations indicated that groundwater, on its own, will not be a viable option to meet all Council's future water supply needs. This is due to a number of technical, environmental, water quality, operational reliability and cost issues that were identified.

The Future Water Strategy's initial assumptions on the costs associated with new groundwater schemes did not reflect what is now known to be the level of complexity in developing a viable solution. Council's understanding of the viability of groundwater resources within the region is better informed as a result of investigations undertaken.

3.2 Indirect potable re-use - wastewater

Investigations have been undertaken in relation to the water recycling option known as indirect potable re-use of wastewater. It involves taking treated effluent from a wastewater treatment plant, putting it through an advanced water treatment process and then releasing it either upstream of an existing water supply (such as a dam) or into a groundwater aquifer.

This water source option is not currently used in NSW, but it is used in other parts of Australia.

The key benefits of indirect potable wastewater re-use include:

- A reliable source of high-quality, treated effluent is available from the region's wastewater treatment plants.
- It is a water source that is not significantly impacted during severe periods of drought.
- Modern technology exists that can safely and effectively treat the water to standards that meet the Australian Drinking Water Quality Guidelines.

Overall, investigations indicate that indirect potable wastewater re-use is currently not a viable water supply option due to its significant regulatory and environmental planning requirements, and uncertain approvals process. In addition, community acceptance of this option is not known.

At this stage, indirect potable re-use of wastewater is only considered viable as a secondary or emergency water supply source to support less expensive options (such as groundwater) that have been fully utilised.

3.3 Desalination

Desalination is climate independent, allowing the production of drinking water from seawater in the most severe drought conditions.

Investigations showed the preferred location for a desalination plant would likely be in the vicinity of the Byron Bay Wastewater Treatment Plant. This was based solely on technical and environmental considerations and did not contemplate social aspects of the location such as community acceptance.

Investigations indicate that desalination in our region is not a viable water supply option due to the significant costs involved in construction and operation.

A desalination plant can only be justified economically if it is operated at close to full capacity on a continual basis. The real benefit of desalination is as an emergency water supply option during severe drought.

3.4 Dunoon Dam

In 1995, Council nominated the proposed Dunoon Dam as a future regional water source, to be developed as required to meet future demand for water.

The Dunoon Dam proposal was extensively investigated during the development of the Future Water Strategy. These investigations showed the proposed Dunoon Dam to be technically viable. Cultural heritage and ecological impact were identified as key considerations for Dunoon Dam.

Noting investigations completed prior to 2014, and additional assessments completed since, the proposed Dunoon Dam remains technically viable.

4. Assessment of feasible new water source options

Based on the outcome of new water source investigations, two scenarios were identified for further assessment. Both scenarios rely on a source of groundwater being brought online as the first action to ensure we meet the revised secure yield assessment for 2022.

- Scenario 1 - Utilisation of Marom Creek Water Treatment Plant (Stages 1 and 2), with additional groundwater sources through Woodburn, Tyagarah (Stages 1 and 2), Newrybar, to achieve the required secure yield (refer Figure 1).

- Scenario 2 - Utilisation of Marom Creek Water Treatment Plant (Stages 1 and 2) with Dunoon Dam (refer Figure 2).

Figure 3 below provides a comparison of each scenario and Figure 4 provides a comparison of each scenario's predicted annual expenditure.

Figure 1: ***Utilisation of Marom Creek Water Treatment Plant with additional groundwater sources***

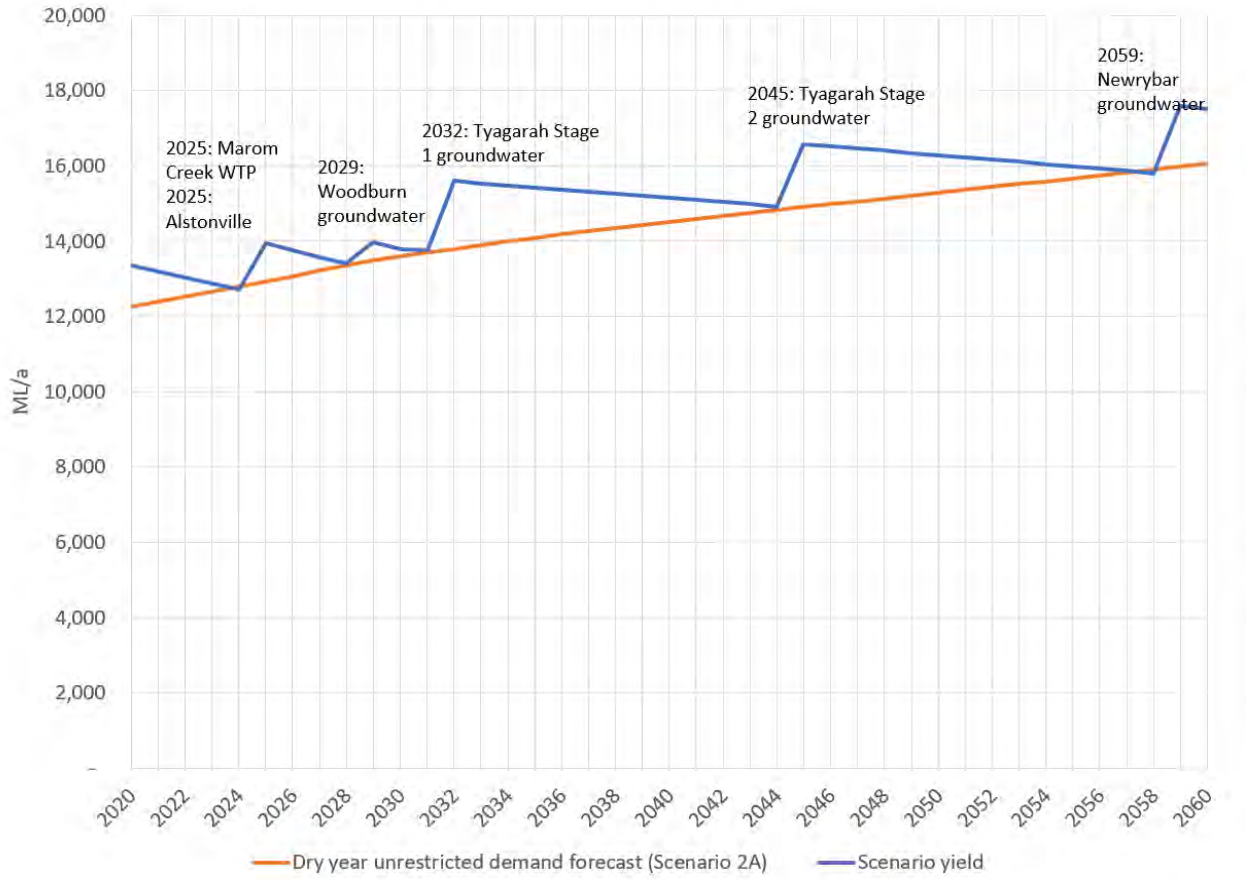


Figure 2: ***Utilisation of Marom Creek Water Treatment Plant with Dunoon Dam***

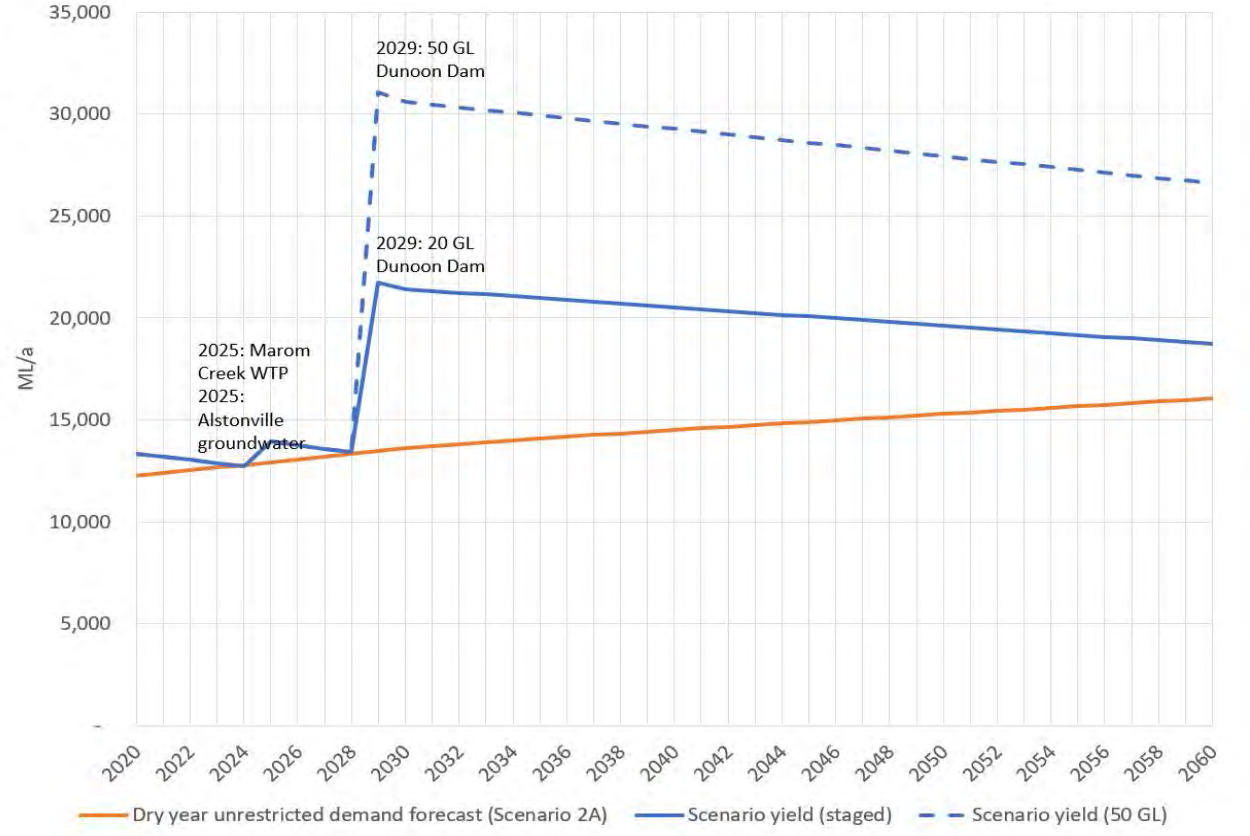


Figure 3: Scenario *comparison*

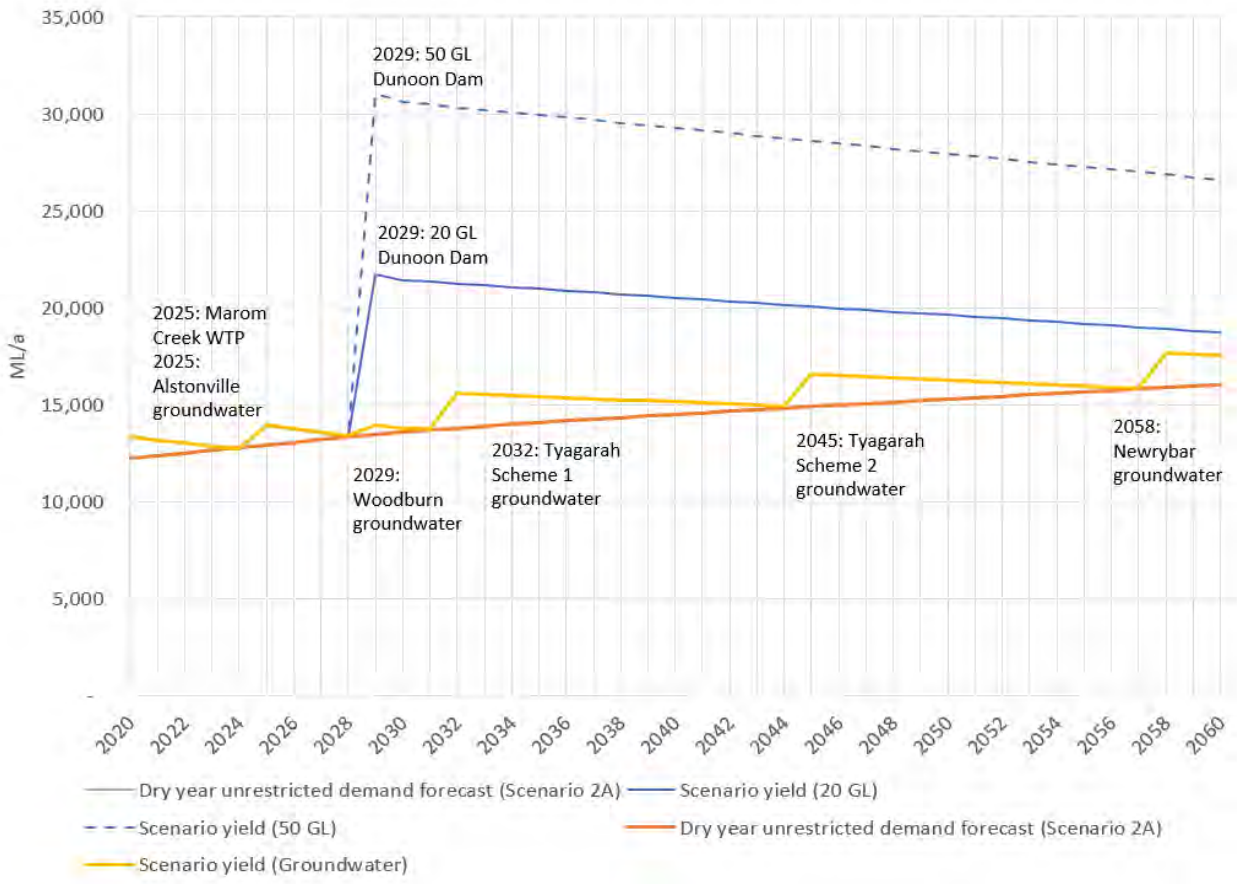
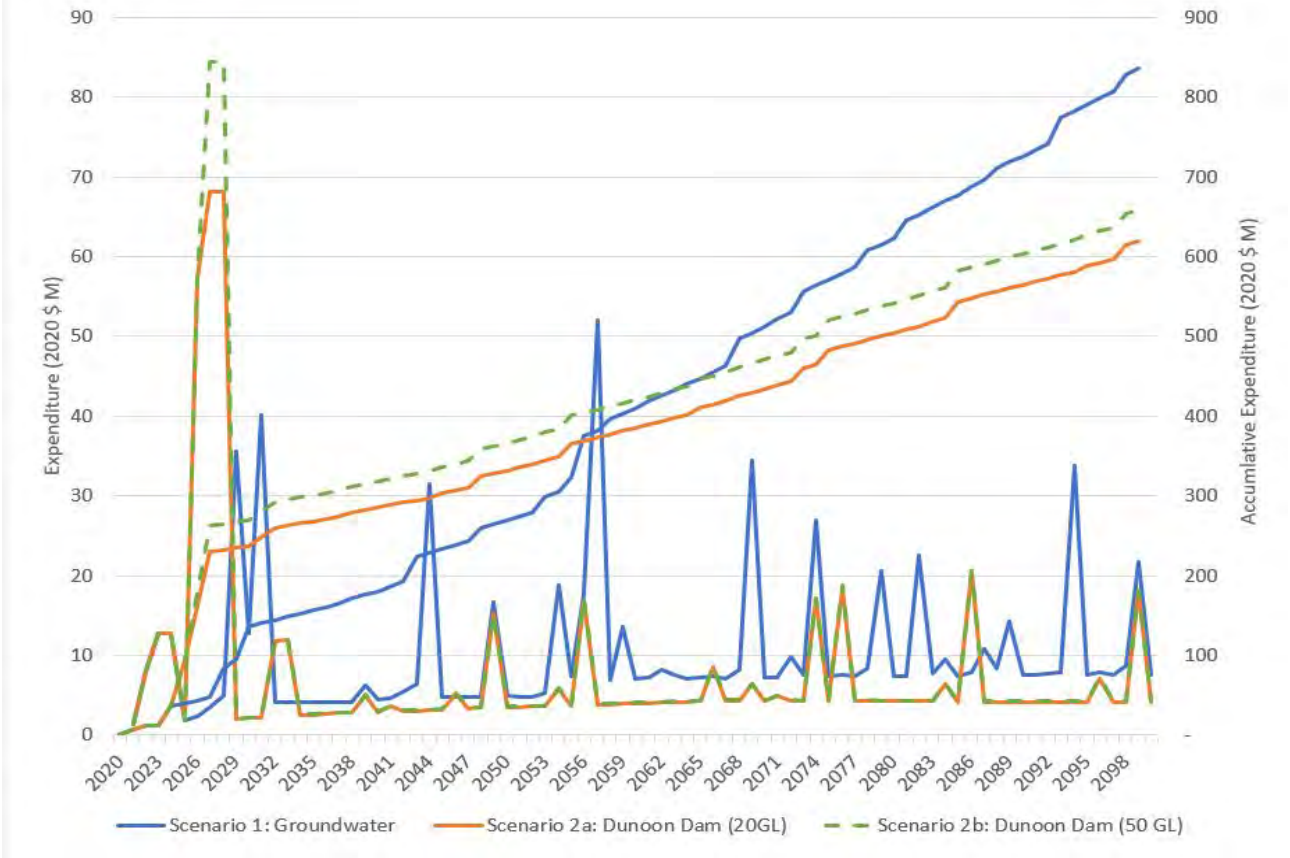


Figure 4: ***Annual expenditure comparison***



4.1 Multi-criteria assessment

A Multi-Criteria Assessment (MCA) methodology has been undertaken by Council, utilising the NSW Government's Integrated Water Cycle Management Information Sheet 2 – Evaluation of integrated water cycle management scenarios (NSW Department of Industry, 2019).

The MCA uses a triple bottom-line (environment, social and economic) assessment criteria (refer to Table 28 in the accompanying attachment). A weighted score and ranking was calculated for each scenario as follows:

(Environmental Score + Social Score)/Net Present Value

Each scenario was also considered in the context of:

- Marginal cost per ML secure yield
- Implementation risks
- Potential adaptive management approaches

The MCA concluded that Scenario 2b – Utilisation of Marom Creek Water Treatment Plant with Dunoon Dam (50 GL) - is the preferred option for Council's future water supply. Refer to the executive summary in the *Future Water Project 2060* Integrated Water Cycle Management Plan which is attached to this report.

4.2 Preferred Scenario Budgets 2020/21

To progress the first action, Marom Creek WTP and associated groundwater infrastructure, requires a 2020/21 budget allocation of $480,000. This allocation provides for Future Water Project staff costs and enable finalisation of the Deed of Agreement and the commencement of environmental licence approvals, asset condition assessment and associated detailed upgrade design plans.

To progress the second action, preliminary investigations in relation to the Dunoon Dam, a nominal budget allocation of $100,000 is required. This allocation provides for Future Water Project staff costs and provides an operating allocation to commence documentation preparation and facilitate initial indigenous and landholder consultation. It is advised that further funding (approx. $400,000) will be requested in the October report following the public consultation phase.

5. Proposed Concurrent Project - Perradenya Estate Pilot Water Reclamation Plant

During the development of the proposed *Future Water Project 2060*, an opportunity was identified to undertake a pilot project, in conjunction with the development consent requirement, to deliver a water reclamation project at Perradenya Estate. This innovative project would complement a number of Council's activities across demand management to future water security.

A key intended outcome of Council's Perradenya Estate's development is to demonstrate ecologically sustainable water management by producing recycled water for all purposes. The development consent includes the construction of a reclamation treatment plant to achieve the highest quality standards for water recycling.

Due to its widely recognised model for sustainable urban development, Council's Perradenya residential estate provides the ideal opportunity to continue investigating the viability of utilising recycled water for drinking and other potable purposes. Currently, the regulatory framework for recycled water supply for direct potable reuse has extensive challenges.

With potential funding assistance from the NSW Government – as well as the support of Southern Cross University (SCU) – there exists a unique opportunity to construct a pilot water recycling plant on the Perradenya Estate site with treatment equipment capable of producing high-quality drinking water for use throughout the residential village.

Building and running a small-scale pilot plant is an ideal opportunity to advance the NSW Water Industry, whilst ensuring critical factors such as water quality, technology and process reliability, environmental sustainability, community acceptance and economic viability can be rigorously tested and validated. The pilot plant would also include the scientific verification of the efficiency of direct potable reuse and support NSW Government agencies to provide policies for the future regulation of direct potable reuse schemes. This will support other New South Wales Local Water Utilities explore direct potable reuse opportunities for their respective regions.
Additional value could also be delivered through the pilot plant's design by including the following features:

- Larger than usual plant footprint to allow better site access – especially for inspections so that others can become familiar with the technology and gain understanding of the process.
- Meeting, teaching and other educational facilities to support engagement with government, industry, interest groups and the community.

Only through partnering with organisations, such as the NSW Government and SCU, will Council have the best chance of being able to demonstrate the required efficacy of a direct potable reuse scheme at Perradenya. SCU will also provide in-kind support by way of its academics to assist with analytical, engagement and regulatory aspects.

Community support within the Perradenya Estate for the use of recycled water for all purposes (both drinking and non-drinking) would also be demonstrated.

It is recommended that Council support the ongoing efforts to progress the pilot recycled water supply for Perradenya estate.

Governance
Finance

Operational Plan 2020/21

As advised in the April 2020 draft Delivery program / Operational plan and budget report, it was identified that a Future Water Strategy report would be submitted at the June 2020 meeting, which would include any budget requirements for 2020/21.

This current report identifies a required budget allocation of $580,000. These funds are available in the Bulk Water Reserve.

Long Term Financial Plan

Council's Long-Term Financial Plan (LTFP) for bulk water augmentation has been based on the Future Water Strategy 2014 (FWS2014) Option 3B - Extended Groundwater.

The LTFP includes capital expenditure for a net $50 million between 2024-29 for source augmentation.
The information contained in this report identifies a revised direction which includes both groundwater and dam options.

Therefore, the LTFP will need to be updated once Council confirms its position.

Environment

Detailed environmental assessments will be required as part of the due diligence for the planning and approval process. While some preliminary environmental investigations have been undertaken more extensive assessments will be required having regard to Council's preferred position.

Legal

The legal considerations in relation to the implementation of the Future Water Strategy, regardless of the preferred option, are many and varied. More precise details of the applicable legal processes and requirements will be able to be defined once a preferred direction is determined by Council. It is expected that external legal advice will be required for the purposes of the project.

Consultation - *Public exhibition*

Council's 2014 Future Water Strategy was adopted following extensive public consultation. The Future Water Strategy's key actions in relation to the timely development of new water sources had broad community support.

It is recommended Council place the proposed Future Water Project 2060 on public exhibition for a six-week period commencing in July 2020. The purpose of this public exhibition period will be threefold:

- Update the community on the outcome of new water source investigations undertaken since the Future Water Strategy was adopted.
- Advise the community of the proposed Future Water Project 2060 and its preferred option for augmenting Council's bulk water supply.
- Invite written submissions in relation to the proposed Future Water Project 2060.

A range of public engagement, communication and other information resources will be developed and deployed as part of the public exhibition period. A further report will be provided to Council at its ordinary meeting scheduled for 21 October 2020.

The proposed Future Water Project 2060 has been developed in consultation with relevant staff from the Constituent Councils.

Due to the regional significance of this project, a written report will be provided to the June meeting of the Northern Rivers Joint Organisation of Councils.

Conclusion

Through reliable delivery of quality drinking water, an ongoing commitment to sustainable business practices and strong indigenous and community relationships Rous has an enviable reputation as a trusted natural resource custodian.

Over the next four decades, Council will need to supply up to an additional five gigalitres of bulk water each year to meet forecast demand.

Following Council's adoption of its Future Water Strategy in 2014, investigations in relation to the timely development of viable new water sources to meet this forecast demand have now been completed and have resulted in the ***Future Water Project 2060 Integrated Water Cycle Management Plan***.

The proposed *Future Water Project 2060* sets out the most viable option for augmenting Council's bulk water supply. The project's preferred option involves two key actions to secure the medium-to-long-term water supply:

- Utilisation of the Marom Creek Water Treatment Plant; and
- Construction of the new 50 gigalitre Dunoon Dam

Marom Creek Water Treatment Plant and Alstonville groundwater utilisation is the preferred first action and will achieve the short-term secure yield outcomes required from existing community owned assets.

In the event that utilisation of the Marom Creek Water Treatment Plant cannot progress, the proposed project also contains a contingency option – development of the Woodburn groundwater scheme.

It is recommended Council endorse the public exhibition of the proposed *Future Water Project 2060* for a six-week period commencing in July 2020. A report on the results of the public exhibition process will be provided to Council for consideration at its October 2020 meeting.

The criticality of the timing of commissioning of an additional water source has been further highlighted through the works undertaken in the development of the *Future Water Project 2060.* This has indicated that there is a requirement for an additional water source by 2022. As a result, it is recommended that in addition to the public exhibition of the *Future Water Project 2060* Council progress a number of preliminary actions in relation to both the project's preferred and contingency options.

The *Future Water Project 2060* represents the product of several decades of investigations. If Council is to delay its decision on the project this will increase the likelihood that water restrictions will be imposed more aggressively resulting in earlier and longer restriction periods. This is an undesirable outcome particularly in relation to the region's growth and economic prosperity. With our growing population and changing climate the time for securing our communities future water sources is now.

Phillip Rudd
General Manager

Attachment

1. *Future Water Project 2060 Integrated Water Cycle Management Plan*.

Hydrosphere Consulting

FutureWater PROJECT 2060

SECURING WATER SUPPLY FOR OUR REGION

ROUS ballina lismore

Rous Regional Supply:

Future Water Project 2060

Integrated Water Cycle Management Development: Assessment of Augmentation Scenarios

Draft Report for Public Exhibition

Disclaimer:

This report has been prepared on behalf of and for the exclusive use of Rous County Council and is subject to and issued in accordance with the agreement between Rous County Council and Hydrosphere Consulting. Hydrosphere Consulting accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

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20-017: ROUS FUTURE WATER PROJECT 2060

REV	DESCRIPTION	AUTHORS	REVIEW	APPROVAL	DATE
0	Draft for RCC review	R. Campbell, K. Menzies	M. Howland	M. Howland	1 June 2020
1	Minor edits	R. Campbell		R. Campbell	5 June 2020
2	Public exhibition	R. Campbell		R. Campbell	9 June 2020

EXECUTIVE SUMMARY

The Rous Future Water Project 2060 identifies new water supply sources to ensure long-term water supply security for the region. This project builds on extensive investigations undertaken by Rous County Council (RCC) over the last few decades to identify potential source augmentation options and enable selection of a preferred long-term strategy. This report documents the outcomes of detailed investigations undertaken regarding potential source augmentation options and implementation scenarios.

Future demand predictions have been developed from the growth predicted in the region. The dry year demand for water at 2060 is predicted to be between 16,000 ML/a and 16,700 ML/a, an increase of approximately 5,000 ML/a over current (2020) dry year demand. The water supply demand has been compared to the secure yield of the system (13,350 ML/a) which has shown that a new water source will be required from 2024. The yield deficit is predicted to be 5,630 ML/a at 2060.

A coarse screening assessment considered a range of new as well as previously identified supply options. The following options passed the coarse assessment and are discussed in detail in this report:

1. Dunoon Dam (20 GL – 50 GL).
2. Connection to Marom Creek WTP (upgraded) with or without local groundwater supplies.
3. Groundwater harvesting – Woodburn, Tyagarah, Newrybar and Alstonville.
4. Desalination.
5. Indirect potable reuse (treated wastewater from constituent council wastewater treatment plants transferred to RCC surface water supplies).

A summary of the options is provided in the following table.

Table 1: Summary of source augmentation options

Option	Yield benefit (2020 – 2060) ML/a	Net present value (NPV, 2020 $, 80 years @ 5%)	NPV (2020 $, 40 years @ 5%) per ML secure yield[1]
20 GL Dunoon Dam	7,179	$204,346,000	$15,000
50 GL Dunoon Dam	15,057	$234,597,000	$27,300
Marom Creek WTP	198	$24,562,000	$111,600
Woodburn (5.0 ML/d)	698	$55,817,000	$73,400
Newrybar (7.2 ML/d)	1,883	$98,567,000	$49,700
Tyagarah (12.5 ML/d)	3,448	$146,240,000	$38,200
Alstonville (4.0 ML/d)	916	$44,110,000	$43,700
Desalination (10 ML/d)	1,550	$84,663,000	$51,000
Indirect potable reuse (10 ML/d)	1,272	Not estimated	Not estimated

1. Calculated from the 40-year NPV @ 5% and the yield benefit at 2060.

This report compares two potential source augmentation scenarios to provide water security to 2060:

- Scenario 1 – Groundwater (with Marom Creek). Scenario 1 includes the connection of Marom Creek WTP to the Rous regional supply in the short term with staged implementation of groundwater schemes and treatment plants until the required supply yield is achieved.
- Scenario 2 – Dunoon Dam. Scenario 2 includes the connection of Marom Creek WTP to the Rous regional supply in the short term with construction of a new dam at Dunoon. Scenario 2A considers a 20 GL dam designed to allow for future augmentation to 50 GL (expected to be required at approximately 2080). Scenario 2B considers a 50 GL dam. Both scenarios include initial implementation of the Marom Creek and Alstonville groundwater options. The Dunoon Dam scenarios include the upgrade of Nightcap WTP in 2034 from 70 ML/d to 100 ML/d.

RCC has developed these two scenarios as they are the only combinations of feasible options that passed the coarse screening and can provide the required secure yield over the long term. The staging and secure yield for each scenario are shown in the following figures compared to the dry year unrestricted demand forecast.

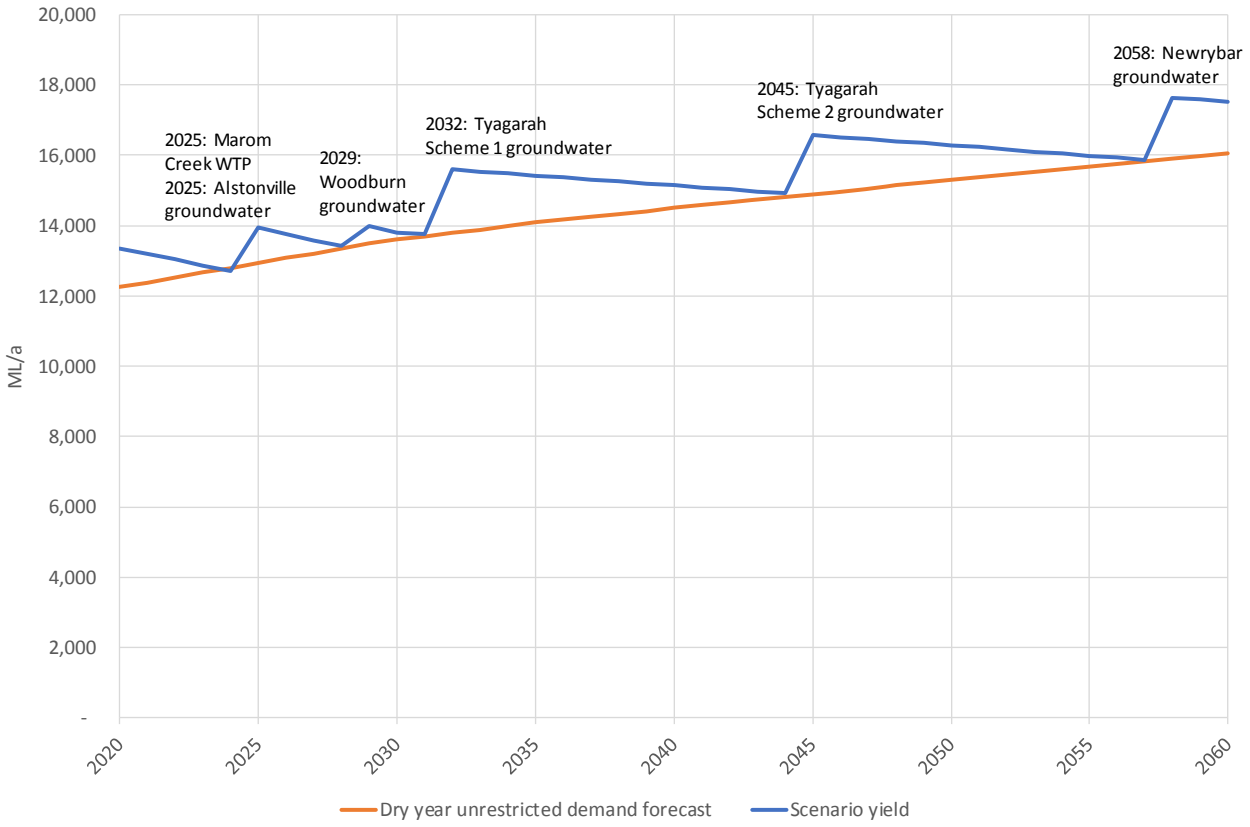

Figure 1: Secure yield and staging for scenario 1: Groundwater

The groundwater schemes identified for Scenario 1 will be able to meet demand until approximately 2072 assuming a similar rate of growth in demand is experienced beyond 2060.

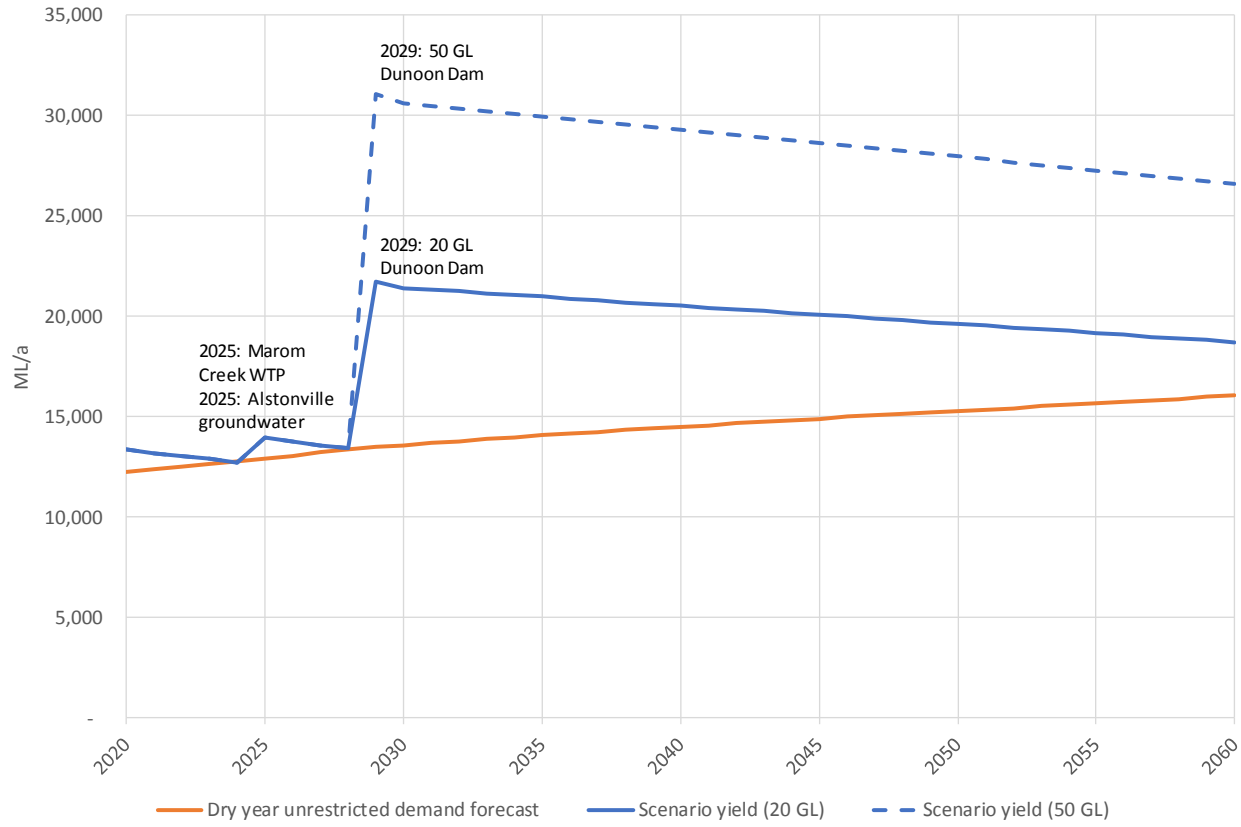

Figure 2: Secure yield and staging for scenario 2: Dunoon Dam

Scenario 2A (20 GL Dunoon Dam) would require augmentation to the 50 GL dam in approximately 2080 assuming a similar rate of growth in demand is experienced beyond 2060 and assumptions about future yield are realised. The 50 GL Dunoon Dam (Scenario 2B) will be able to meet demand until approximately 2115.

Whole of life and NPV cost estimates for the water supply scenarios are shown in the following table.

Table 2: Scenario cost estimates

Component	Scenario 1: Groundwater (2020 $)	Scenario 2A: 20 GL Dunoon Dam (2020 $)	Scenario 2B: 50 GL Dunoon Dam (2020 $)
Whole-of-life (80 years)	$836,397,007	$619,141,183	$658,907,966
NPV (80 years @ 5%)	$195,922,792	$242,778,718	$267,518,613
NPV (40 years @ 5%)	$169,299,256	$228,151,363	$252,602,785
Yield benefit (2020 – 2060)	4,170	5,370	13,249
NPV/ML secure yield (40 years)	$40,597	$42,484	$19,066

The scenarios have also been compared using a multi-criteria analysis (MCA) considering environmental, social and financial outcomes. A summary of MCA outcomes is provided in the following table.

Table 3: Summary of MCA outcomes

Scenario	Environmental score (/5)	Social score (/5)	Total score (per $ NPV)	Rank (based on MCA)
1: Groundwater	3.05	3.50	16.2	1
2A: Dunoon Dam (20 GL)	2.65	1.98	9.9	2
2B: Dunoon Dam (50 GL)	2.30	1.65	7.8	3

Based on the MCA, the most favourable scenario is groundwater. The groundwater scenario has a lower NPV (lower initial capital cost but higher and increasing recurrent costs with implementation of each stage) as well as less significant environmental and social impacts. However, the groundwater scenario has a higher whole-of life cost (total cost over 80 years in present dollars) and a higher NPV per ML of secure yield as shown in Table 2. Implementation of the groundwater scenario will require ongoing investigations (and associated costs and problem-solving) for the four groundwater schemes.

Although the MCA is informative, it is focussed on the 2060 planning horizon and RCC should consider longer-term issues such as potential source options beyond that timeframe and financial commitment and funding requirements imposed by the schemes. Dams have a long design life and there is excess secure yield in the Dunoon Dam options well beyond the 2060 timeframe considered by this study. When the long-term yield benefit provided by the scenarios is considered, the 50 GL dam option (with high initial cost and lower recurrent costs) with the higher yield benefit is more cost-effective. Although there is a large upfront investment, the dam options can provide long-term certainty and cost efficiencies. The largest dam for the given physical constraints, with planned staging and upgrades, provides only a small incremental risk over the smaller dam. There is a trade-off between the high initial cost and environmental/social impact of the dam and the long-term cost-effectiveness and certainty provided.

Implementation risks have been identified in this report for both scenarios. RCC should continue to conduct detailed investigations for its preferred scenario and address these risks. Although the yield information suggests that definitive action is required in the short-term, adaptive management approaches should also be identified.

CONTENTS

FIGURES

TABLES

1. INTRODUCTION

Rous County Council (RCC) provides bulk water to four local water utilities (LWUs) on the far north coast of NSW, servicing the urban areas of the following constituent council local government areas (LGA):

- Ballina Shire Council (BaSC), excluding Wardell and surrounds.
- Byron Shire Council (BySC), excluding Mullumbimby.
- Lismore City Council (LCC), excluding Nimbin.
- Richmond Valley Council (RVC), excluding Casino and all land west of Coraki.

RCC also provides water supply services to rural and urban connections direct from the bulk supply trunk main system (retail customers).

The Rous Future Water Project 2060 identifies new water supply sources to ensure long-term water supply security for the region. This project builds on extensive investigations undertaken by RCC over the last few decades to identify potential source augmentation options and enable selection of a preferred long-term strategy. This report documents the outcomes of detailed investigations undertaken regarding potential source augmentation options and implementation scenarios. The scenarios have been compared using a multi-criteria analysis considering environmental, social and financial outcomes.

2. BACKGROUND

2.1 History of Strategy Development

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 (WRS), drawing freshwater from the upper limits of the Wilsons River tidal pool, upstream of Lismore.
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.

Detailed investigations into options for Dunoon Dam, a concept design, environmental and cultural heritage assessments commenced in 2008 and were completed in 2013 (refer Section 7). Public consultation undertaken at the time indicated that the community's preference was for RCC to consider the future water supply issues more broadly before proceeding with Dunoon Dam. As a result, RCC commenced work on the Future Water Strategy (FWS). The available information at that time indicated that existing water supplies would be 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 background information and the decision-making process for the development of the FWS were captured in the integrated water planning (IWP) process (MWH, 2014). The integrated planning approach involved (MWH, 2014):

- Identification of future water management issues over a long-term planning horizon.
- Development of strategy assessment triple-bottom-line objectives and criteria in response to the water management issues.
- Assessment of options and scenario development in order to address the water management issues.
- A participatory approach with stakeholder feedback.
- Recognition of future uncertainties and implementation risks, requiring ongoing monitoring and review.

The FWS was adopted in 2014 with three key actions – demand management, increased use of groundwater and potentially water re-use. Since the adoption of the FWS, RCC has undertaken extensive investigations into groundwater as an additional source. These studies included extensive reviews and consultation with stakeholders to identify appropriate groundwater investigation areas as well as conducting groundwater drilling programs (refer Section 9). These studies found that groundwater sources investigated in Newrybar (coastal sands), Woodburn (coastal sands) and Dunoon (fractured rock aquifers) will require higher cost than previously estimated, 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 have been further investigated as part of the Rous Future Water Project 2060 (refer Section 9).

2.2 Demand Management

Demand management has been an integral part of planning and management of water supply assets and ongoing supply management in the region since 1995 and these initiatives have been successful in reducing water demand. The demand per connection has decreased with these water conservation measures as well as pay-for-use pricing and water restrictions imposed during the 2002/03 drought. In recent times, the rate of reduction in per connection consumption has reduced as the level of water conservation in the community already achieved means that there is less opportunity for further reduction in consumption. Although further reduction in per connection demand is likely to be more difficult to achieve in the future, the water utilities in the region are committed to responsible water use and ongoing reduction in demand. Enhanced demand management initiatives presented in the FWS were reviewed in 2018 to build on the successes of previous demand management initiatives and continue to deliver comprehensive and effective water conservation programs throughout the region. 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 between 2019 and 2022. Demand management actions adopted in the plan area are as follows:

- Monitoring, evaluation and reporting.
- Water loss management.
- Sustainable water partner program (businesses and community groups).
- Smart metering.
- Recycled water.
- Rainwater tank rebates.
- Community engagement and education – households, schools and high residential water users.

2.3 Specialist Studies

As part of the Rous Future Water Project 2060, specialist studies have been undertaken to further investigate the following source augmentation options:

- Groundwater supplies.
- Indirect potable reuse.
- Desalination.
- Dunoon Dam.

A revised demand forecast (Section 0) and assessment of secure yield of the above options were also undertaken. The findings of these studies are documented in this report.

2.4 Regional Investigations

2.4.1 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; BaSC, BySC, LCC and 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 8).

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, with the resulting augmented supply expected to be sufficient to 2046. 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 they are not implemented in the short-medium term.

2.4.2 Toonumbar Dam

Local councils have been in discussions with Water NSW during 2019 about the potential to access additional releases from Toonumbar Dam. 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 (Hydrosphere Consulting, 2020b). 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 (Hydrosphere Consulting, 2020b). However, it is not possible to convert existing water entitlements to town water supply licences under the existing Water Sharing Plan for the Richmond River. The Water Sharing Plan is due for review and update by June 2022.

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 as part of that study. Options involving raising of Toonumbar Dam and increased access to water for town water supply needs are potentially viable source augmentation options for the RCC regional supply although there is insufficient information available at present to pursue these options (refer Section 6).

3. EXISTING BULK WATER SUPPLY

The RCC bulk and retail water supply transfer network is shown on Figure 3. The supply network extends from Ocean Shores in the north and Byron Bay in the east, west to Lismore and south to Evans Head. Surface waters are the primary water resource utilised by RCC although there are also some groundwater sources available for use during dry periods (Table 4). The principal component of the RCC bulk supply is Rocky Creek Dam (RCD) situated 25 km north of Lismore near the village of Dunoon. Water from RCD is treated at the Nightcap Water Treatment Plant (WTP) and is distributed through three trunk mains owned and operated by RCC. One trunk main supplies treated water to Lismore and to the Richmond Valley area. The other two mains supply Byron Bay and Ballina Shires. Water from the WRS upstream of Lismore is pumped directly from the Wilsons River to the Nightcap WTP for filtration and distribution to consumers. Water from Emigrant Creek Dam (ECD) is treated at the Emigrant Creek WTP and is distributed to supplement supplies to Ballina and Lennox Head.

Table 4: RCC raw water sources

Details	Rocky Creek Dam	Emigrant Creek Dam	Wilsons River Source	Converys Lane bore	Lumley Park bore	Woodburn bores
Water Source[1]	Terania Creek	Alstonville Area	Wyrallah Area (Wilsons River)	Bangalow Groundwater	Alstonville Groundwater	Richmond Coastal Sands
Source Type	Large in-stream storage	Large in-stream storage	Run-of-river abstraction	Groundwater extraction	Groundwater extraction	Groundwater extraction
Storage capacity	14,000 ML	820 ML	-	-	-	-
Area served	Lismore City, Richmond Valley, Ballina and Byron Shires	Ballina and Lennox Head	Lismore City, Richmond Valley, Ballina and Byron Shires	Alstonville, Wollongbar	Alstonville, Wollongbar (dry periods)	Woodburn, Evans Head, Broadwater (dry periods)
Water Treatment	Nightcap WTP (68 ML/d)	Emigrant Creek WTP (7.5 ML/d)	Nightcap WTP	Chlorination	Chlorination	Chlorination
Licence entitlement	12,358 ML/a[2]	2,620 ML/a[2]	5,400 ML/a[2]	150 ML/a[3]	530 ML/a[3]	242 ML/a[4]

1. As specified in the relevant Water Sharing Plan.
2. Water Sharing Plan for the Richmond River Area Unregulated, Regulated and Alluvial Water Sources (2010).
3. Water Sharing Plan for the Alstonville Plateau Groundwater Sources (2003).
4. Not subject to a Water Sharing Plan.

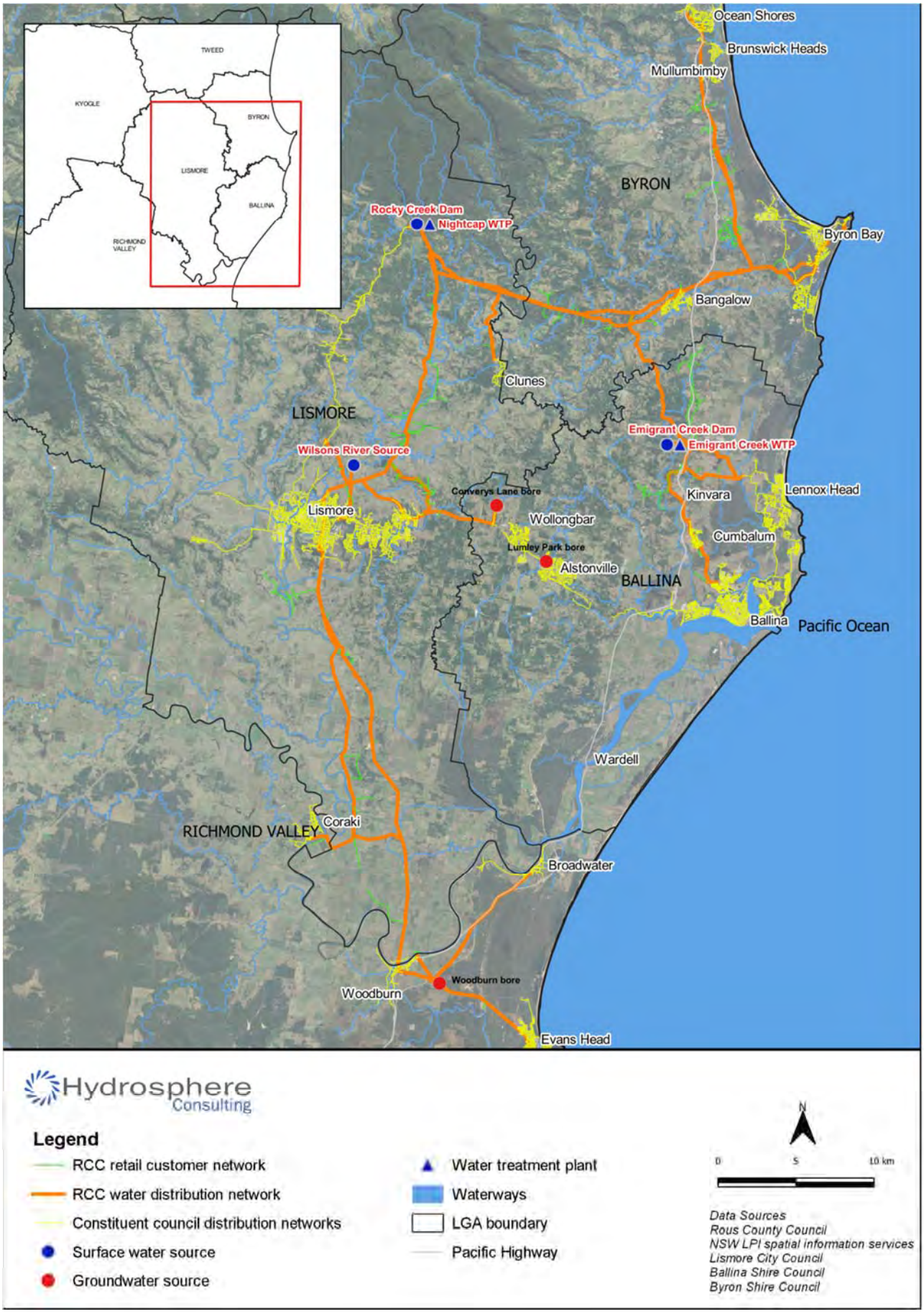

Figure 3: Regional bulk supply network

Table 5 summarises the current operating rules for the regional supply which are based on RCD storage levels.

Table 5: Bulk water supply operating rules

RCD supply level (% of full supply volume)	Status	Source Usage
100%	Normal Operation	RCD only
95%		Start WRS and ECD
60%	Dry Period Operation	Start Woodburn bores, Converys Lane bore
30%		Start Ballina Shire Council's plateau bores
20%	Emergency Operation	Start emergency supply source
15%		
10%		

4. DEMAND FORECAST

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 has been updated as part of the Rous Future Water Project 2060 (Hydrosphere Consulting, 2020a).

The Rous regional bulk supply currently services 41,870 connected residential properties and 5,110 connected non-residential properties (total 46,980 connections). By 2060, the Rous regional bulk supply is predicted to serve 57,560 connected residential properties (based on estimated lot yields) and 9,360 connected non-residential properties (total 66,920 connections). The Rous regional bulk supply currently produces 11,300 ML/a (five-year average). The predicted average demand per connection has been estimated for each connection type in each supply area. Dry year demand per connection has also been estimated based on climate correction of the bulk supply demand.

Future demand predictions have been developed from the growth predicted in the region (two growth scenarios for Ballina Shire and one growth scenario for other supply areas as provided by the constituent councils) and predicted water loss reduction (nil savings – using current water losses and savings predicted by the council water loss management plans) as follows:

- Demand Scenario 1A: Revised forecast dry year demand (estimated Ballina lot yield, current water losses).
- Demand Scenario 1B: Revised forecast dry year demand (upper estimated Ballina lot yield, current water losses).
- Demand Scenario 2A: Revised forecast dry year demand (estimated Ballina lot yield, reduced water losses).
- Demand Scenario 2B: Revised forecast dry year demand (upper estimated Ballina lot yield, reduced water losses).

The dry year demand for water at 2060 is predicted to be between 16,000 ML/a and 16,700 ML/a, an increase of approximately 5,000 ML/a over current dry year demand. The four demand scenarios are compared to the 2013 forecast demand in Figure 4.

The annual demand in each five-year period for each scenario (current supply area) and the local supply areas are provided in Table 6.

RCC has indicated that water loss reduction actions will be implemented, therefore Scenario 2A will be used for future water supply planning.

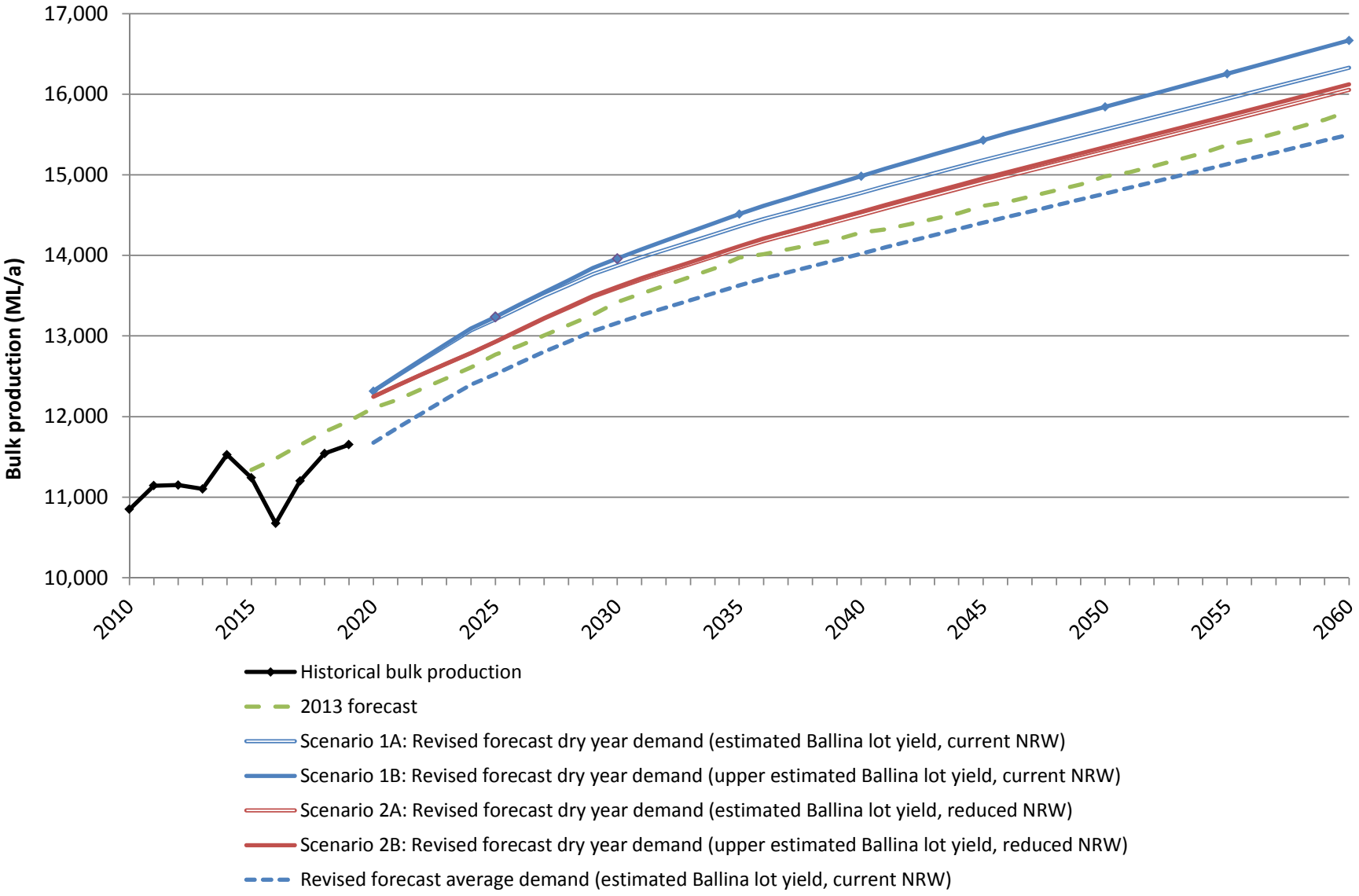

Figure 4: Forecast demand (bulk production) scenarios and comparison with the 2013 forecast – Rous bulk supply area

Table 6: Demand forecast scenarios – Rous bulk supply area (ML/a)

Scenario	2020	2025	2030	2035	2040	2045	2050	2055	2060
Existing bulk supply area									
Scenario 1A: Revised forecast dry year demand (estimated Ballina lot yield, current water losses)	12,315	13,208	13,872	14,359	14,775	15,179	15,560	15,943	16,328
Scenario 1B: Revised forecast dry year demand (upper estimated Ballina lot yield, current water losses)	12,319	13,236	13,959	14,512	14,982	15,429	15,842	16,253	16,667
Scenario 2A: Revised forecast dry year demand (estimated Ballina lot yield, reduced water losses)	**12,247**	**12,925**	**13,595**	**14,084**	**14,500**	**14,905**	**15,286**	**15,669**	**16,054**
Scenario 2B: Revised forecast dry year demand (upper estimated Ballina lot yield, reduced water losses)	12,247	12,930	13,610	14,112	14,540	14,954	15,342	15,731	16,121

5. SECURE YIELD

5.1 Secure Yield Methodology

The current NSW Security of Supply Methodology in NSW has been in use for over 25 years and modelling approaches have been developed to determine the secure yield based on this methodology. The security of supply basis has been designed to cost-effectively provide sufficient storage capacity to allow a water utility to effectively manage its water supply in future droughts of greater severity than experienced over the past 100 or more years. 'Secure yield' is now defined as the highest annual water demand that can be supplied from a water supply headworks system while meeting the '5/10/10 design rule'. This rule dictates that water restrictions must not be too severe, not too frequent, nor of excessive duration, hence under the NSW Security of Supply requirement, water supply headworks systems are normally sized so that:

a) Duration of restrictions does not exceed 5% of the time; and

b) Frequency of restrictions does not exceed 10% of years (i.e. 1 year in 10 on average); and

c) Severity of restrictions does not exceed 10%. Systems must be able to meet 90% of the unrestricted dry year water demand (i.e. 10% average reduction in consumption due to water restrictions) through simulation of the worst recorded drought, commencing at the time restrictions are introduced.

This enables water utilities to operate their systems without restrictions until the volume of stored water approaches the restriction volume. If at this trigger volume, the utility imposes drought water restrictions which reduce demand by an average of 10%, the system would be able to cope with a repeat of the worst recorded drought, commencing at that time, without emptying the storage. Water security is achieved if the secure yield of a water supply is at least equal to the unrestricted dry year annual demand (NSW Office of Water, 2013).

Estimating the yield of a headworks system involves two stages:

- Stream flow estimation: Developing an appropriate sequence of stream flows for the water sources; and
- System behaviour modelling: Modelling the behaviour of the headworks system subject to operating constraints using the stream flows to assess what demand subject to reliability or security criteria can be satisfied.

Consideration also needs to be given to possible impacts of climate change. Draft *Guidelines on Assuring Future Urban Water Security* (NSW Office of Water, 2013) provide guidance to NSW local water utilities on assessing and adapting to the impact of variable climatic patterns on the secure yield of urban water supplies. The methodology in these guidelines enables local water utilities to estimate their future secure yield taking into account the expected impact of future climatic patterns.

Determining the impact of climate change on the secure yield of a water supply system involves two modelling steps:

- Modification of daily rainfall and evapotranspiration data and calibrated rainfall-runoff models to produce climate changed daily stream flows; and
- The daily climate changed streamflow, rainfall and evapotranspiration are input into the water supply system simulation models to determine climate changed secure yields.

The methodology has been developed from a pilot study (Samra and Cloke, 2010) which involved undertaking hydrological and system modelling to determine the impact of climate change on secure yield. The pilot study incorporates the scientific logic of the CSIRO's Murray Darling Basin Sustainable Yields

Project which used daily historical data from 1895 to 2006 and applied the relevant global climate models (GCMs) to provide projected (~2030) climate changed data for each GCM for this period.

The rainfall-runoff model is used to estimate daily stream flows for each GCM and for the historical data provided with the GCM data. The current system simulation model is used to determine the secure yield for each of the 15 GCMs, as well as for the above historical data on the basis of the 5/10/10 design rule.

Whilst the 15 GCMs represent a range of plausible climate futures for around the year 2030, there is some uncertainty which needs to be acknowledged when considering the full range of possible outcomes. The secure yield is determined for all 15 GCMs under the 5/10/10 design rule as well as the secure yield for the GCM with the lowest yield for a more severe restriction regime (10/15/25). The critical results are for:

- GCM with the median secure yield under the 5/10/10 design rule.
- GCM with the lowest secure yield under the 5/10/10 design rule.
- GCM with the lowest secure yield under the 10/15/25 design rule.

5.2 Secure Yield of Existing System

The secure yield assessment has been undertaken using the RCC Bulk Water Supply Security Model which was developed by Engeny Water Management in 2019 using GoldSim 12.1. The secure yield of the existing system for the climate experienced over the last 120 years and with 1°C climate warming is presented in Table 7.

Table 7: Secure yield – existing system

Historic climate (5/10/10)	Reduction factor	1°C climate warming
13,350	0.882	11,776

Source: Engeny (2020)

The guidelines do not specify the year to apply the yield with the climate experienced over the last 120 years, the decline in yield to the projected 1°C climate warming and the decline in yield beyond that time. The following assumptions have been made:

- The secure yield with the current climate is assumed to represent the available supply in 2020.
- The secure yield with projected 1°C climate warming is assumed to represent the available supply in 2030.
- Between 2020 and 2030, there is assumed to be a linear reduction in secure yield.
- Beyond 2030, the secure yield is assumed to reduce at a slower rate until 2060.

The dry year unrestricted demand forecast (Demand Scenario 2A: estimated Ballina lot yield, reduced water losses) is shown in Figure 5 compared to the secure yield. Figure 5 shows that the existing system yield will be sufficient to supply the dry year unrestricted demand until approximately 2024. The yield deficit at 2060 is 5,630 ML/a.

The above secure yield estimates do not consider the impact of changed environmental flow regimes as discussed in Section 5.3.

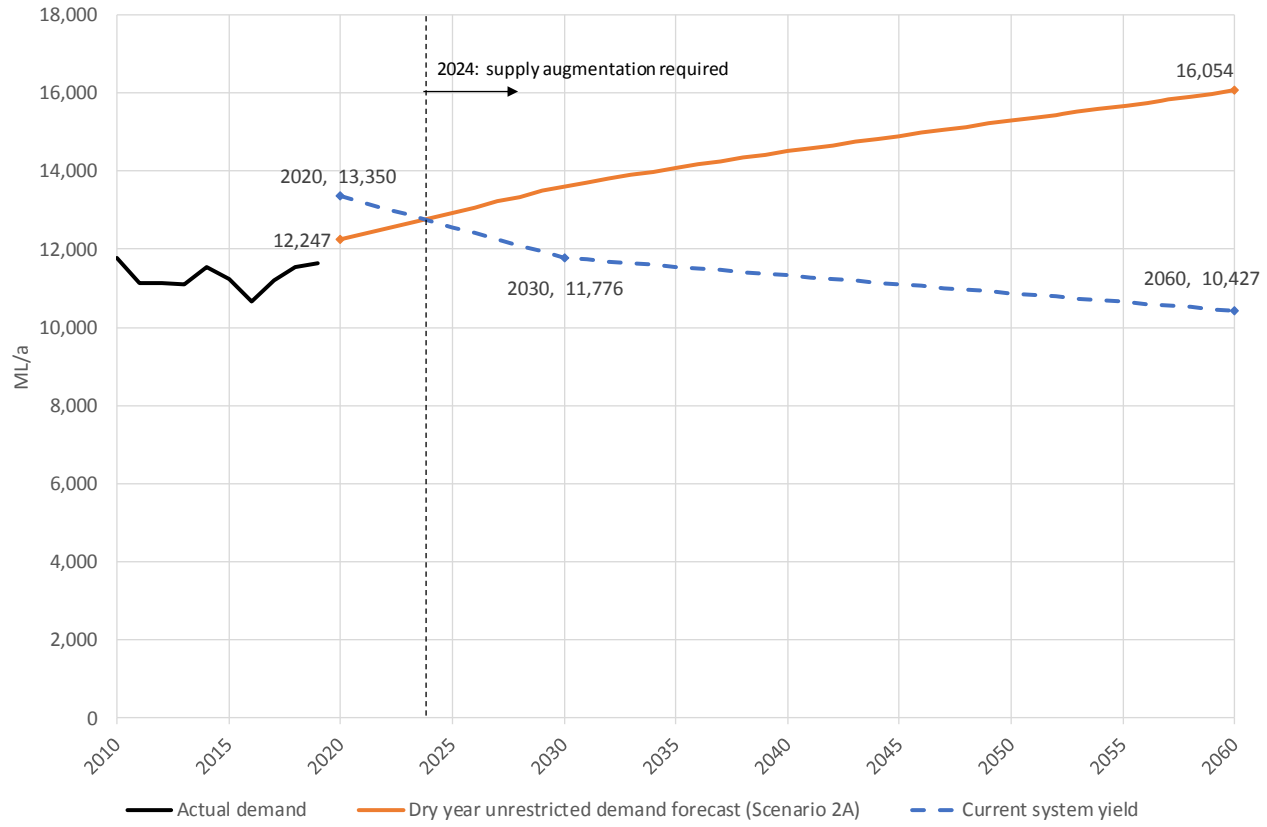

Figure 5: Comparison of existing system secure yield and demand forecast

5.3 Review of Environmental Flow Regimes

Hydrosphere Consulting (2020c) documents a review of environmental flow regimes for each existing surface water source and Dunoon Dam to identify any potential implications for the operation of the supply sources and hence determine the impact of changed regimes on the secure yield. The desktop review documents the likely extent of influence of current riverine extractions on downstream environments considering the influence of other catchment impacts on these reaches. Recommended environmental flow requirements were developed through critical review of available information, previous studies of downstream environments and the likely impacts of extraction assessed through analysis of modelled hydrological data and reference to other relevant literature. Key outcomes of the review for the existing surface water sources are summarised as follows:

Rocky Creek Dam (RCD):

- There are no currently provisions for environmental flow releases from RCD and it is not a requirement of the current water access licence. Downstream flow in Rocky Creek below the dam occurs as a result of overflows (spilling) of the dam during high flow conditions and seepage through the dam wall (approx. 0.7 ML/d). These conditions have been in place for approximately 70 years since dam construction in the early 1950s.
- RCD is having a large hydrological impact on all flow components in Rocky Creek, except for the highest flood flows (> 500 ML/d). Impacts are particularly pronounced during low flow periods occurring from late winter, through spring into early summer when the dam spills very infrequently. Previous assessments have identified that there are downstream ecological impacts due to RCD and associated water extraction and that these impacts are exacerbated by modified catchment conditions downstream of the dam (e.g. catchment clearing and altered land use leading to water quality decline and habitat degradation).

- Previous assessment of pre-determined environmental flow scenarios for RCD determined that none of the scenarios were adequate to protect aquatic ecosystems, a conclusion that is supported by the 2020 review.
- Any future environmental flow scenario for RCD would need to be formulated and justified through a robust assessment of existing environmental conditions and associated flow requirements. It is acknowledged that provision of environmental flows at RCD is likely to significantly affect secure yield of this water source and require infrastructure modifications to allow for regulation of releases and physical monitoring of dam inflows and outflows. Therefore, the environmental benefits for Rocky Creek will need to be considered holistically in comparison to the impacts of alternative source augmentation to determine an appropriate balance.

Emigrant Creek Dam (ECD):

- The current water access licence requires that when flow is entering ECD, the flow in the downstream watercourse should be equivalent to the flow entering the storage or sufficient to maintain visible flow at Tintenbar downstream of the dam, whichever is the lesser.
- Environmental flow releases at ECD occur via a water outlet pipe in the base of the dam which remains open with an estimated discharge of approximately 0.8 ML/d. This is the only current provision for environmental flow during low flow (non-spilling) periods.
- The modified hydrology as a result of ECD operations appears to be having the greatest impact on low to moderate flows in Emigrant Creek with a pronounced impact on moderate flow events which occur during late spring and early summer. During these times naturally occurring peaks in flow or ‘freshes’ are not passed downstream of ECD, due to dam filling after a prolonged dry period. This is expected to impact downstream water quality, overall water levels and habitat availability as well as fish passage and enhance drying of habitat and substrate. The modelling indicates that high flows and flood flows are not greatly impacted by current water supply operations and therefore impacts on channel geomorphological processes and high flow biological triggers for species are expected to be minimal in Emigrant Creek.
- The current environmental flow regime, with a minimum estimated flow of 0.8 ML/d has been in place for many years. This flow is likely to exceed natural flows at some times of the year when there is no inflow to ECD, however given the modified nature of the catchment, it is considered that this elevated baseflow during these periods is beneficial, particularly in relation to water quality, and it is likely that the aquatic environment now has some dependence on this minimum flow. Despite this, the current provision for base environmental flow at ECD of 0.8 ML/d is regarded as unlikely to be sufficient to fully protect downstream aquatic ecosystems and is likely to be leading to sub-optimal outcomes for the ecological functioning of the creek.
- It is acknowledged that the provision of more onerous environmental flows for ECD is likely to reduce overall water supply security and increase or bring forward the need for additional water supply sources. In this case, the environmental benefits for Emigrant Creek will need to be considered holistically in comparison to the impacts of source augmentation to determine an appropriate balance.

Wilson River Source (WRS):

- Environmental flow requirements for the WRS are built into the water access licence pumping rules that are based on Wilsons River flows. Abstractions from the WRS tidal pool cause changes to flow rates in the Wilsons River below the abstraction point creating a slight decrease in the rate of low to moderate flows. This causes minor upstream movements of saline water under average and low flow conditions.

6. COARSE SCREENING ASSESSMENT

The coarse screening assessment undertaken for the 2014 FWS has been updated (Hydrosphere Consulting, 2020b). The source augmentation options considered included all options from the 2014 FWS as well as new options identified since then. The outcomes of the coarse screening assessment are given in Table 8.

Table 8: 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 – RCD, ECD and WRS.	Existing sources will not meet future demand.	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 1,200 ML/a.	High capital cost and environmental impact for low future yield.	Fail
2b	Raise ECD	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
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

No.	Option	Description	Conclusion	Result
3c	Pipeline from Toonumbar Dam or Eden Creek to Casino or RCD	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
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
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
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

No.	Option	Description	Conclusion	Result
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
9 – Wastewater recycling				
9a	Indirect potable reuse to surface waters	Highly treated reclaimed water supply into RCD, ECD or WRS 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

No.	Option	Description	Conclusion	Result
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

The following options were not considered in detail in the development of the 2014 FWS (due to low yield benefit and/or other risks). The findings of the original IWP process are still considered valid and these options will not be considered further in this report:

- Raise RCD.
- Raise ECD.
- 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 this report:

- Pipeline from existing Toonumbar Dam or Eden Creek to Casino or RCD.
- 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 following options passed the coarse assessment and are discussed in detail in this report:

1. Staged Dunoon Dam (20 GL – 50 GL).
2. Connection to Marom Creek WTP (upgraded) with or without local groundwater supplies.

3. Groundwater harvesting – Woodburn, Tyagarah, Newrybar and Alstonville.
4. Desalination.
5. Indirect potable reuse (treated wastewater from constituent council wastewater treatment plants transferred to RCC surface water supplies).

Options involving use of water from Toonumbar Dam will not be considered in the Rous Future Water Project as the NSW Government's infrastructure options study will not be completed within the required timeframe.

Demand management will not be considered as a source augmentation option but will be an integral part of the long-term strategy through the implementation of the RDMP (Section 2.2).

7. OPTION 1: DUNOON DAM

7.1 Concept Design

The Dunoon Dam site is located on Rocky Creek downstream of the existing RCD. The site is approximately 2.5 km west of the village of Dunoon. The dam would store inflows from its catchment up to the existing RCD and from spills over the RCD spillway. Water from Dunoon Dam would be pumped to the Nightcap WTP and subsequently used for town water supply throughout the RCC service area.

Three possible dam types were considered in an Options Study (Public Works Dams and Civil, 2013a). The two options considered viable were:

- Earthfill type embankment across the creek with an excavated spillway in the left abutment.
- Roller compacted concrete gravity structure where spill flows are accommodated over the central part of the wall into the creek below.

Although the roller compacted concrete dam would involve a much larger haulage of materials from off-site locations, it requires a significantly smaller footprint on the site, reducing both the physical and visual impact on the local environment and was therefore preferred in the Options Study. A concept design for a 50 GL roller compacted concrete has been prepared (Public Works Dams and Civil, 2013b) including:

- A roller compacted concrete gravity structure with a 30 m wide central overflow spillway.
- A concrete dissipator at the toe of the spillway to collect spill flows and prevent erosion of the foundation and potential undermining of the dam wall.
- An intake structure attached to the upstream face of the wall with facilities for selective withdrawal of water from the storage.
- A conduit located in the creek bed under the dam wall, used initially for creek diversion during construction and then converted to a permanent outlet pipe connecting the base of the intake structure to the valve house immediately downstream of the dam.
- A valve house structure housing the main guard valves and downstream discharge valves as well as the main branch line to the adjacent raw water pumping station.
- A concrete dissipator at the downstream end of the valve house to accommodate outlet flows and avoid erosion of the foundation.
- A pumping station and associated equipment to enable the transfer of raw water from the toe of the dam to existing water mains at Dorroughby.
- 8 km long rising main from the pumping station to Dorroughby.
- 3.3 km of new access road (including two bridges) plus 9 km of upgraded road.
- Power supply, electrical and telemetry facilities.

A 50 GL storage provides a full supply level (FSL) at RL 82.25 mAHD. The maximum flood level (MFL) is at RL 90.02 mAHD with the dam crest level at RL 90.60 mAHD which allows for appropriate freeboard as required by the NSW Dams Safety Committee (Public Works Dams and Civil, 2013b).

A 20 GL storage has also been investigated as a possible staged approach to construction of the dam (Public Works Dams and Civil, 2013c). As for the 50 GL arrangement, the 20 GL dam would incorporate a concrete gravity structure with a 30 m wide spillway at the centre of the dam and plunge pool at the downstream toe. A diversion tunnel would be located at creek bed level, just left of the spillway through the dam wall. This would be converted to an outlet tunnel once construction of the dam has been completed. An

intake structure would be attached to the back of the wall while an outlet/valve house would be located at the downstream end together with an associated pumping station. Design features would be incorporated in the 20 GL arrangement to facilitate future raising of the dam:

- The positions of the valve house and pumping station are located downstream of the dam to suit a larger dam.
- Sizing of the pumping station, valve house, pipework and associated equipment has been determined to suit a larger dam.
- The section dimensions for the intake tower allow for possible future raising of the storage to 50 GL.

The 20 GL storage provides a FSL at RL 67.20 mAHD, MFL at RL 74.36 mAHD and the dam crest level at RL 74.96 mAHD.

Figure 6 shows the dam inundation area for the two storage options. The surface area at FSL is 1,650,000 m² and 2,430,000 m² for the 20 GL and 50 GL storage volumes respectively (based on dam stage storage data provided in Public Works Dams and Civil (2013a). Figure 6 also shows the route of the rising main to Nightcap WTP and the new access road.

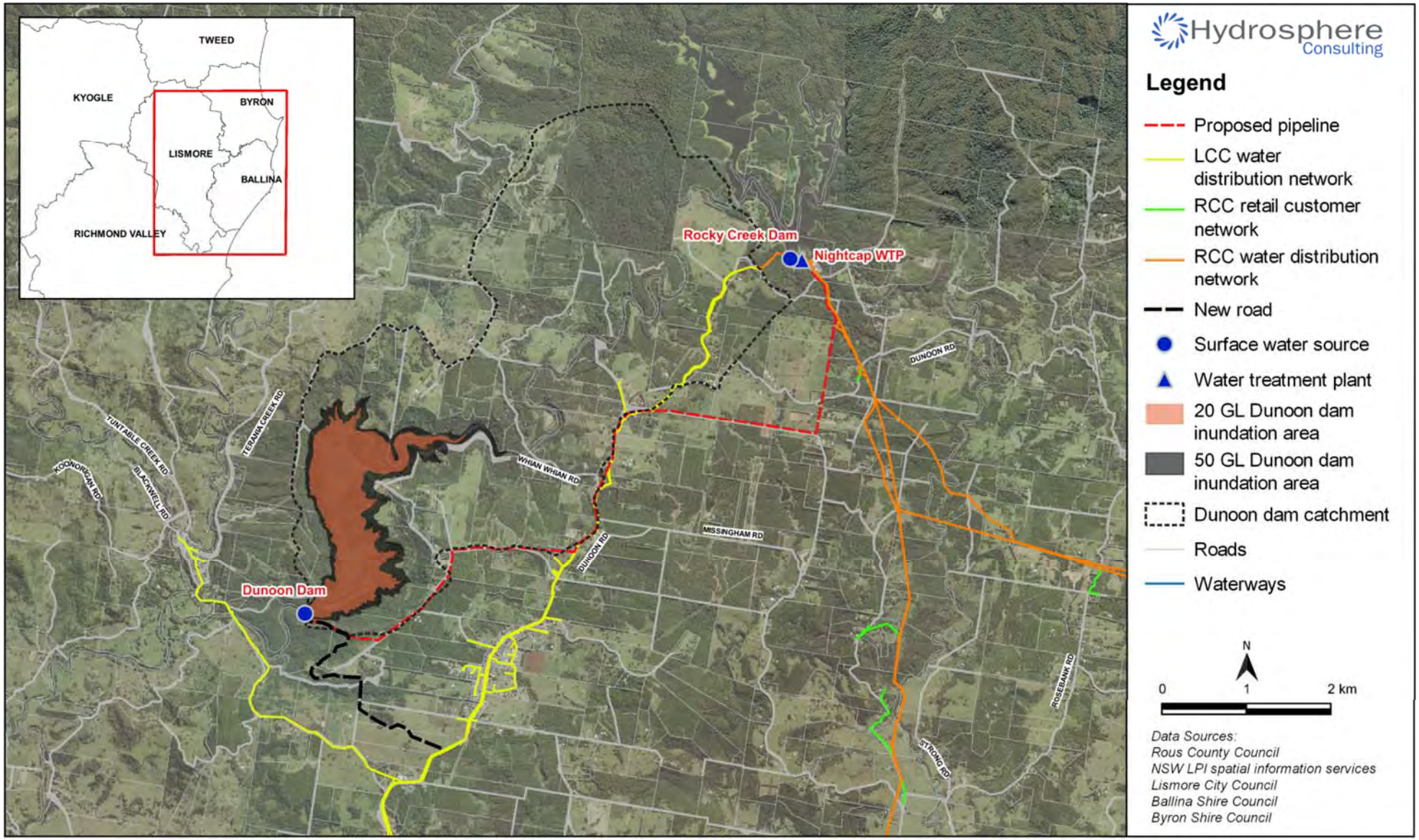

Figure 6: Dam location and inundation area for 20 GL and 50 GL storage options

7.2 Catchment Description

The Dunoon Dam would have a catchment area of approximately 19 km^2. Dunoon Dam would also receive overflows from RCD and therefore when RCD is spilling, the Dunoon Dam catchment area also incorporates the RCD catchment, giving a total catchment area of 50 km^2 (Hydrosphere Consulting, 2020d). Figure 7 provides an overview of mixed land use in the catchment. RCC currently owns several parcels of land within the Dunoon Dam catchment and would seek to purchase the remaining land within the buffer zone surrounding the dam, should this option be adopted for future water supply. The remaining catchment areas are either protected as parks and reserves or are under private ownership. Whian Whian Falls is a popular recreational location with easy access from the public road. If constructed, the upstream extent of the 50 GL Dunoon Dam would be just downstream of the base of the falls. Currently, cleared grazing land makes up approximately 40% of the catchment, horticulture (primarily macadamia farms) occupy 30%, and approximately 18% of the catchment is classified as parks and reserves (the majority of which is within Nightcap National Park). The remaining land uses comprise rural residential lots (4.6%), cropping (2.2%), forestry (1.3%) and rivers and drainage channels (4.4%) (Hydrosphere Consulting, 2020d).

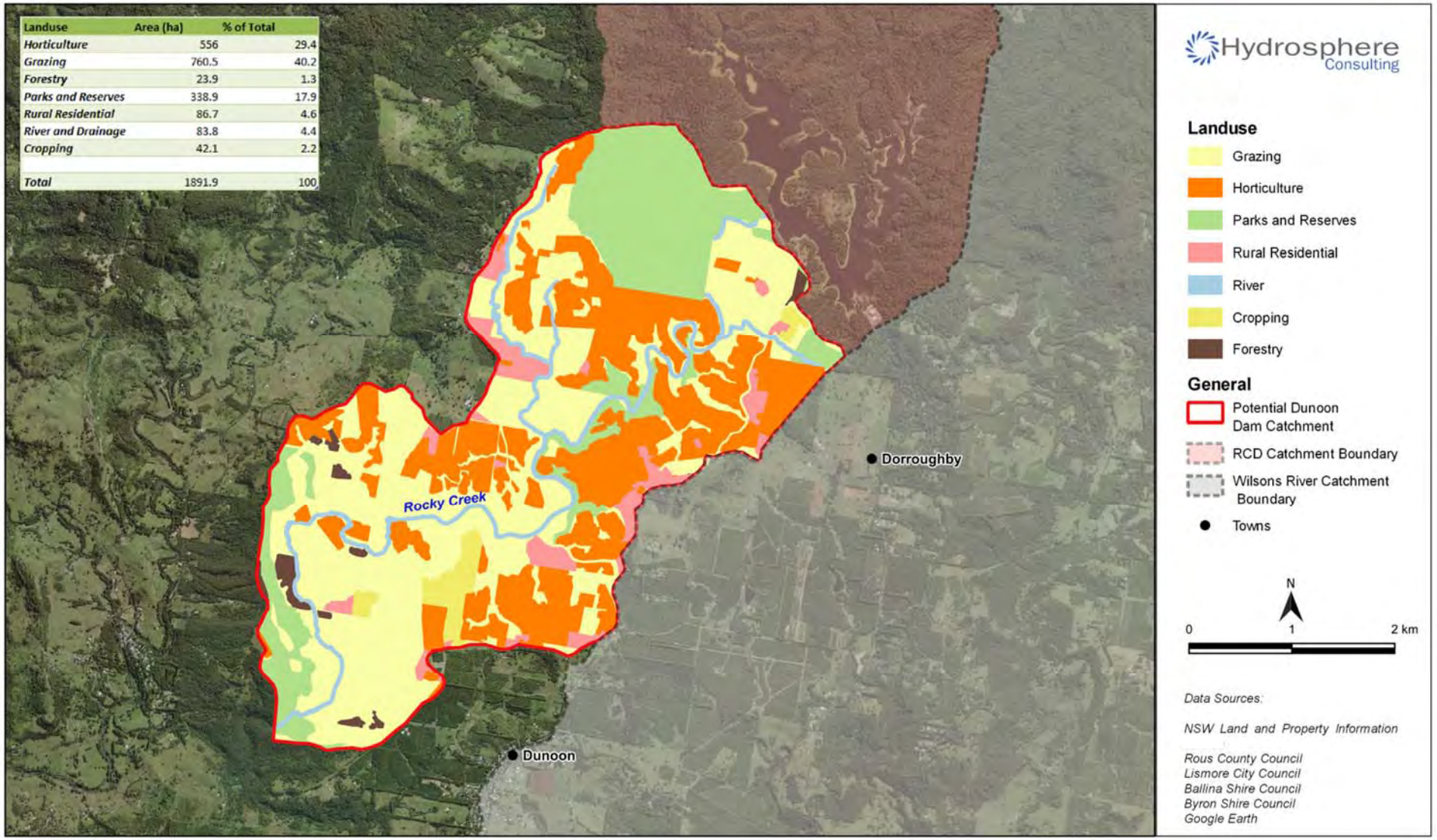

Figure 7: Dunoon Dam catchment and existing land use

Source: Hydrosphere Consulting (2020d)

7.3 Planning and Approvals Pathway

RCC has obtained preliminary planning pathway advice for the Dunoon Dam proposal (Public Works Advisory, 2020a). *State Environmental Planning Policy (State and Regional Development) SEPP 2011* designates development that is state significant development, state significant infrastructure, critical state significant infrastructure and regionally significant development. The Dunoon Dam would be State Significant Development in accordance with the requirements of the State and Regional Development SEPP as the development has a capital investment value of more than $30 million and is permitted with development consent in land use zone W1 Natural Waterways under the Lismore Local Environmental Plan 2012 and permitted without consent in land use zone RU1 Primary Production under SEPP (Infrastructure) 2007 (as per current land zonings under the LEP). The Minister for Planning (or the Independent Planning Commission) would be the consent authority.

An Environmental Impact Statement (EIS) would need to be prepared in accordance with Schedule 2 of the *Environmental Planning & Assessment Regulation, 2000.* The approvals expected to be required are summarised in Table 9.

Table 9: Summary of likely approvals required

Agency	Requirements	Reference
Department of Planning, Industry and Environment (DPIE)	Development consent	Pt 4, Division 4.7, *Environmental Planning and Assessment Act, 1974*
Department of Primary Industries - Fisheries	Notification to the Minister for the construction of a new dam	Section 218, *Fisheries Management Act, 1994*
	Permit for dredging or reclamation work undertaken by a local government authority	Section 200, *Fisheries Management Act, 1994*
Environment Protection Authority (EPA)	Environment protection licence for extractive activities and concrete works (possible)	Chapter 3, *Protection of the Environment Operations Act, 1997*
DPIE - Water	Water Access Licence for water use	*Water Management Act, 2000*
Department of Agriculture, Water and the Environment (Commonwealth)	Referral for significant impact on Matters of National Environmental Significance (MNES)	*Environment Protection and Biodiversity Conservation Act, 1999* (Commonwealth)

Source: Public Works Advisory (2020a)

7.4 Terrestrial Ecology

A survey and assessment of the terrestrial ecology for the footprint of the dam, the buffer region surrounding this footprint and associated access to the dam wall area (SMEC, 2011) was undertaken to identify ecological constraints to inform feasibility assessments and concept planning for the dam. The study consisted of a desktop assessment and seasonal flora and fauna surveys undertaken between April and October 2010. A summary of the findings of the terrestrial ecological assessment from SMEC (2011) is provided below.

The study area is characterised by extensively cleared agricultural land containing remnant fragments of native vegetation occurring primarily along riparian corridors and a larger fragment within the sandstone escarpments of the west and south of the proposed dam wall. The condition of native vegetation and habitat varied from poor (areas infested with exotic species) to good (less accessible areas around the proposed

dam wall), depending on the level of historic clearing and disturbance from agricultural activities (SMEC, 2011).

One endangered ecological community (EEC), Lowland Rainforest which is listed under the *Threatened Species Conservation Act* 1995 (TSC Act), was recorded during field investigations. In addition, nine flora and 17 fauna species (including one frog, one mammal, one fruit-bat, six microbats and eight birds) listed as threatened in NSW under the TSC Act were also recorded. Of these species, eight flora and one fauna species are also listed nationally under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). An additional seven fauna species listed as migratory or marine under the EPBC Act as well as two Rare or Threatened Australian Plants (RoTAP) and three regionally significant plant species were also recorded (SMEC, 2011).

The proposed dam would clear a total of 272 ha of vegetation, of which 57 ha is predominantly native (Warm Temperate Rainforest, Subtropical Rainforest with 34 ha of Lowland Rainforest EEC, Tallowwood Open Forest and Flooded Gum-Tallowwood-Brush box Open Forest). The loss of rainforest communities is considered to be particularly significant, given the regional history of clearance for timber and plantations and thus fragmented nature of the remnants of these communities (SMEC, 2011).

The dam would remove important habitat features and local linkages for threatened fauna species. In particular, movement pathways for the threatened Koala will be impeded from the installation of the dam wall, spillway and the inundation area. Loss of feeding resources for the listed Grey-headed Flying Fox, Rose-crowned Fruit-dove and White-eared Monarch and nesting resources for migratory birds from the removal of rainforest and Camphor laurel communities is also likely to be significant within the study area. Further, the loss of foraging resources provided within the dry sclerophyll forests, which are rare in the region, will impact on the threatened Glossy-black Cockatoo and Scarlet Robin. Loveridges Frog (*Philoria loveridgei*) was also found just outside the footprint of the proposed dam at a lower elevation and more southerly point than has been previously recorded. Habitat for this species may also be impacted by the proposal (SMEC, 2011).

The works will also remove threatened flora species within the inundation and dam infrastructure areas and their habitat. There is also the potential for indirect impacts through key threatening processes such as the spread of *Lantana camera* and dieback caused by the root-rot fungus (*Phytophthora cinnamomi*) (SMEC, 2011).

Assessment of the impacts (without mitigation) has determined that the works would significantly impact all threatened flora species detected (nine species) and 15 of the recorded threatened fauna species and their habitat within the study area. Mitigations measures have been identified to minimise impacts on terrestrial ecology including design considerations, pre-construction and construction phase actions. Measures to minimise wildlife connectivity impacts, removal of threatened flora and endangered ecological communities and minimising impacts on fauna habitat have also been identified including fauna bridges.

However, residual impacts that cannot be minimised to acceptable levels through mitigation will still be present. Significant impacts are still likely to occur as a result of:

- Loss of Lowland Rainforest EEC.
- Loss of threatened flora species and RoTAP species.
- Loss of threatened fauna habitats.
- Severance of local wildlife corridors.

Habitat and conservation offsets are an option to compensate for these significant impacts to terrestrial biodiversity as a result of the proposed dam. The buffer area surrounding the dam could be used as an offset for the dam, however additional areas may also be required to be reserved for conservation, managed and improved as part of an offset package for the dam, should it proceed. SMEC (2011) recommended that an

Offset Strategy is prepared detailing the location of offsets, ecological restoration requirements, and ongoing management requirements and to investigate opportunities to improve the habitat linkage between Nightcap National Park (5 km to the north and a listed World Heritage Area) along Rocky Creek to the dam site. Although the proposal is likely to have a significant impact on important vegetation within the study area (both endangered ecological communities and habitat for threatened species), there are also large areas within the study area and around it that were once rainforest or wet sclerophyll forest but are now infested with weeds (SMEC, 2011). These areas could benefit from improved management as part of offsets for the project. This has the potential to reduce the significance of the impact of the dam, if managed appropriately. Further assessment of these options would be required prior to seeking project approval.

An assessment of terrestrial ecology impacts will be required in accordance with the provisions of the *Biodiversity Conservation Act, 2016* including requirements of the Biodiversity Offsets Scheme using the Biodiversity Assessment Method.

7.5 Buffer Zone Planning

The establishment of vegetated buffer zones around water supply reservoirs is a recognised catchment management strategy which helps to protect the water quality and reduce risks to water supply. Hydrosphere Consulting (2009) developed a Buffer Zone Strategic Plan through a desktop assessment which analysed the environmental requirements for the buffer zone of the proposed Dunoon Dam (50 GL) through an evaluation of industry standards, catchment conditions and water quality risk.

Hydrosphere Consulting (2009) recommends a three-part approach to water quality management in the catchment involving the protection of high-risk areas with the storage buffer, targeted riparian management in the upstream catchment and community education to encourage improved farming practices and land management in the catchment.

The recommended buffer zone identified by the assessment has an average width of approximately 180 m from the maximum inundation area and covers approximately 224 ha of land surrounding the storage. The boundaries for the proposed buffer zone are shown in Figure 8. Despite a high degree of existing vegetation within the proposed buffer zone, there is also a large amount of weed infestation. Significant weed management and/or native planting effort will be required to maximise the biodiversity benefits and water quality protection characteristics of the buffer zone (Hydrosphere Consulting, 2009).

The extent of individual landholdings that form part of the buffer zone would need to be acquired by RCC to implement the buffer zone strategy.

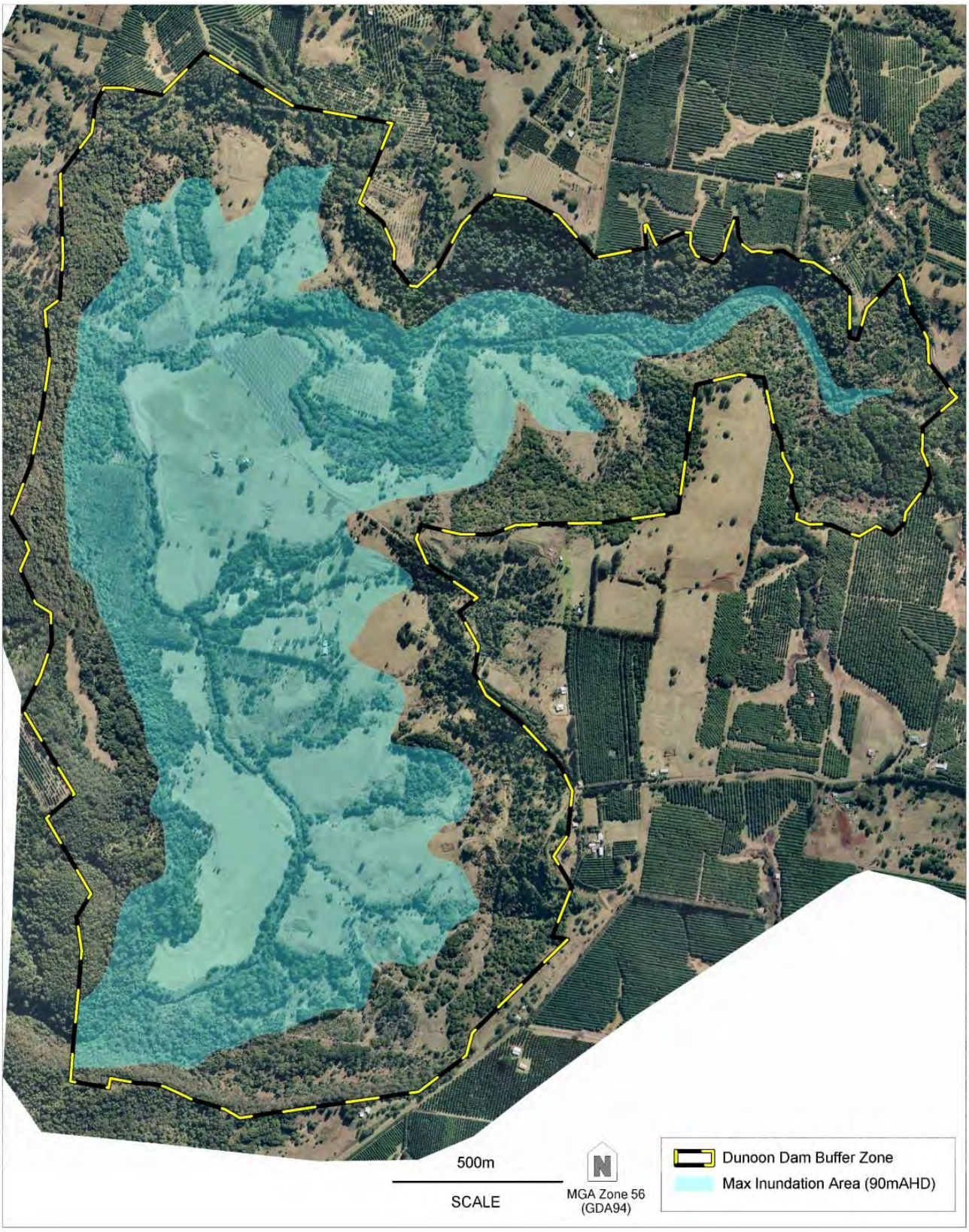

Figure 8: Proposed Dunoon Dam (50 GL) buffer zone

Source: Hydrosphere Consulting (2009)

7.6 Aquatic Ecology

An aquatic ecology assessment was undertaken to examine the potential impacts of the proposed dam on aquatic habitats and communities upstream, within and downstream of the proposed dam inundation area (ELA, 2012a). The assessment was updated following a peer review (SMEC, 2012). A summary of the findings of the aquatic ecological assessment from ELA (2012a) is provided below.

A detailed program of desktop and field-based survey was undertaken to examine key aspects of the aquatic ecology. Desktop surveys included review of previous studies in and around the study area and searches of the relevant databases for potential threatened species presence. Field studies included assessment of aquatic and riparian flora, aquatic and riparian habitat, water quality and fauna surveys including fish, other vertebrates (primarily birds, platypus and amphibians) and macroinvertebrates (ELA, 2012a).

The desktop assessment, including database searches, found one EEC, 30 flora, six frog, 24 bird and three mammal species listed as threatened within or around the study area. Three fish species, Eastern Freshwater Cod, Purple Spotted Gudgeon and Oxleyan Pygmy Perch were identified as potentially occurring in the study area (ELA, 2012a).

Flora surveys showed variable habitat condition along the reach with poorer condition generally relating to the level of disturbance or clearing in the immediate catchment surrounding the site. Areas with more intact tree cover showed few exotic species and better overall condition. The number of exotic species showed a general increase downstream from RCD to the Terania Creek sites. Small-leaved Privet, Camphor Laurel and Lantana were significant weed species found in several riparian zones. Brazilian Watermilfoil was identified as a potentially significant exotic macrophyte (ELA, 2012a).

The water quality assessment identified that the current water quality is good with most key parameters falling within or below the ANZECC specified range. The large pool below the proposed dam wall remained weakly thermally stratified for the entire survey period and there were several short periods where the temperature difference between the surface and bottom temperatures was greater than 1°C, indicating that stratification is a normal part of the function of that pool. Flows of approximately 20 ML/d (at RCD) for several days were sufficient to reduce thermal stratification to less than 1°C. Water quality is maintained in this system by low and even base flow levels (ELA, 2012a).

Aquatic macroinvertebrates surveys recorded 5,055 individuals from 73 families and 23 orders. Vertebrate surveys identified 13 fish species, two frog species and 28 bird species, with no rare or threatened species recorded. No introduced fish species were found. Platypus surveys identified individuals at several sites during various surveys and burrow clusters were found at the three sites surveyed (ELA, 2012a).

Wildlife database searches identified that the Eastern Freshwater Cod, Purple Spotted Gudgeon, Oxleyan Pygmy Perch and Black Necked Stork may occur in the study area, however, these species were not recorded during the field surveys. An assessment of significance determined that the proposed dam is unlikely to have a significant impact on these species (ELA, 2012a). Given records and potential habitat for this species in the area, ELA (2012a) recommended that additional survey work undertaken for a more detailed impacts assessment should consider the occurrence of these species and whether assessment under the EPBC Act is required.

Mitigation measures and monitoring requirements were recommended to address the impacts on aquatic ecology resulting from the altered flow patterns in Rocky Creek as a result of the construction and operation of the proposed dam. As there are no current provisions for controlled release of water from RCD, there are few if any flow related management measures that can be implemented upstream of Dunoon Dam. The channel form and ecological function of impacted reaches has stabilised following the adjustment to the impact of the current operation of RCD and has an armoured bed, as such this reach is resistant to impacts from change in flow regime including the reduction in spilling flows from RCD. ELA (2012a) recommended that practical management upstream of the Dunoon Dam should focus on improving general catchment and riparian condition to minimise sedimentation processes through stock exclusion and the planting of riparian

endemic native species. Minor flow-based management may be achieved through refinement of operating rules to achieve balance between sustainable yield of both dams and minimise hydrological impacts on this reach may be possible.

Potential mitigation measures within the inundation area were also identified including stratification, algae control, sediment and nutrient trapping, foreshore management and offsetting the loss of aquatic and riparian habitat within the inundation area. Offsetting and/or conservation options within the larger Terania Creek catchment are recommended in the assessment of environmental flows (ELA, 2012b).

The assessment of environmental flows (ELA, 2012b) discussed in Section 7.7 has proposed an environmental flow regime for the proposed dam to protect the key aspects of creek hydrology, ecology, process and function. Maintaining (or improving) the environment through the environmental flow regime will largely negate the requirements for further significant mitigation measures. The low flow contingency releases will act to improve the environment for key species with connecting releases and other habitat provision when the current flow regime would remain unconnected (ELA, 2012a).

The construction of a fish ladder or lift is not recommended by ELA (2012a) as it would likely only provide artificial lake habitat for migrating species as Whian Whian Falls at the upstream end of the proposed dam lake acts as a natural migration barrier to habitats further upstream. If species were able to migrate beyond Whian Whian Falls they could only access the additional reach to the RCD wall. In this case the potential habitat quantity and quality above the proposed dam wall does not justify the expense of a fish ladder (ELA, 2012). In preference to a fish ladder, options to improve the aquatic and riparian habitat in the larger Terania catchment through fencing from stock and establishment of an endemic native riparian buffer are preferred by ELA (2012a). This buffer will act to improve the riparian and aquatic habitat through the reduction of inflowing sediment and nutrients, improve water quality through shading and provision of endemic organic material and the creation of habitat for riparian and semi-aquatic species.

Hydrosphere Consulting (2020c) considered that the proposed dam will present a barrier to both upstream and downstream fish migration. It is important that environmental flow design is undertaken with due consideration of fish passage and options for integrated design to achieve optimum outcomes. For example, there is potential for any environmental flows to attract fish to the base of the dam and without a fishway to facilitate movement further upstream, the fish may aggregate at this location and be susceptible to increased predation and potentially poor water quality which could result in fish kills. Additionally, fishways require water to run, which provides opportunities for using this operational water to provide a base environmental flow.

The aquatic ecology and environmental flows assessment may also require more detailed assessment to focus on the proposed dam disturbance and inundation area. ELA (2012a) also recommended that the Offset Strategy (refer Section 7.4) should include mitigation of potential impacts on aquatic and riparian habitat.

7.7 Environmental Flows

An environmental flow assessment was undertaken to determine if an environmental flow regime within the Rocky Creek system could be developed that would maintain and/or improve the downstream environment, in consideration of ecological needs and the current legislative framework (ELA, 2012b). The assessment was updated following a peer review (SMEC, 2012). A summary of the findings of the environmental flow assessment from ELA (2012b) is provided below.

A holistic study was undertaken to examine the environmental flow requirements of the current system. This approach integrated information from a range of disciplines including ecology, hydrology, water quality and geomorphology. A combination of desktop review, hydrological and geomorphic modelling and field studies was undertaken by ELA (2012b) to determine the key flow requirements of the system.

Modelled flows at a daily time-step at several points along Rocky Creek, Terania Creek and Leycester Creek using the Integrated Quantity Quality Model (IQQM) were used in the review for a 114-year period. Flow data for the natural and current (with RCD online and current system operating rules) were compared to determine the nature of the hydrological regime in the creek system. Assessment and comparison of data was undertaken via examination of hydrographs for different periods, key flow statistics such as mean, maximum and minimum, flow duration analysis, flood frequency analysis and determination of the rates of rise and fall of flood events.

Field investigations undertaken by ELA (2012b) included detailed survey of the physical stream environment including channel morphology and the relationship between flow and physical processes. Ecological and environmental surveys were undertaken to detail key species (flora and fauna), water quality and habitat at three time periods from October 2010 to June 2011 to capture seasonal variations. Field surveys were conducted at a range of locations to facilitate comparison between different potential impact zones and an unimpacted control area.

Hydrological assessment showed that both the natural and current Rocky Creek flow regimes are highly variable with extended periods of low flows and floods occurring at any time of the year. RCD has reduced flows downstream of the dam from the base flow to moderate flow range, but larger flood events are largely unaffected as they tend to fill and spill the dam. Data for natural flows show key flow components of base flows (2-6 ML/d), low flows (6-30 ML/d) and moderate flows (30-200 ML/d) are responsible for maintaining key ecological, water quality and channel functions. High flows (>200 ML/d) including floods greater than 17,000 ML/d provide for channel disruption and formation processes through movement of large cobbles and high energy flows (ELA, 2012b).

Geomorphic assessments showed that Rocky Creek below RCD is largely confined, with limited potential for erosion. The main unarmoured zone of Rocky Creek will be inundated by the proposed dam. Below RCD, the character of the channel is dominated by boulder and bedrock structures. These channel types are predominantly controlled by large flood events (ELA, 2012b).

Water quality in the system was indicative of good condition throughout the survey period. Nutrients, turbidity and chemical characteristics were all either well within the recommended ANZECC guidelines or where these guidelines were not met were in a range that is not critical to biota, ecological processes or physical function or the creek system (ELA, 2012b).

The flora and fauna in Rocky Creek are adapted to a flow regime dominated by disruptive high flows that move large and small sediments, and scour in-stream and riparian vegetation. Maintenance of a flow regime that provides for irregular high flows and maintains base to moderate flow variability, including natural rates of rise and fall, should maintain and/or improve channel habitats and ecological condition in the Rocky Creek system downstream of the proposed Dunoon Dam. At the key flow level of 100 ML/d the main fish barriers downstream of the proposed Dunoon Dam infrastructure are open for migration to all potential fish species including the threatened Eastern Freshwater Cod (ELA, 2012b).

Following detailed survey and assessment of the hydrology, geomorphology, water quality and aquatic ecology of the Rocky Creek system a set of environmental flow rules was established by ELA (2012b) with the specific objective to maintain or improve the environmental and habitat values downstream of the proposed dam. These flow rules provide for a largely unchanged flow regime for flows up to 100 ML/d with contingency flows provided for prolonged dry periods. The general flow rules are:

- Transparency of inflows up to 100 ML/d at Dunoon Dam.
- If inflow to Dunoon Dam exceeds 100 ML/d, maintain release of 100 ML/d.
- When inflow to Dunoon Dam drops below 100 ML/d, allow natural rates of fall.
- If the unregulated spill exceeds 100 ML/d, no transparent release.

Further a set of contingency rules was developed by ELA (2012b) to permit longitudinal channel connection in key fish migration periods during prolonged dry periods. These rules are:

- If inflow to Dunoon Dam is less than 0.7 ML/d, maintain release from Dunoon Dam of 0.7 ML/d.
- If, by March 1, there has been < 3 days of inflows ≥ 100 ML/d (either as one or multiple events) over the preceding 60 days, release 100 ML/d for 3 consecutive days.
- If, by August 1, there has been < 3 days of inflows ≥ 100 ML/d (either as one or multiple events) over the preceding 60 days, release 100 ML/d for consecutive 3 days.
- If, by October 1, there has been < 3 days of inflows ≥ 100 ML/d (either as one or multiple events) over the preceding 50 days, release 100 ML/d for consecutive 3 days.

These general environmental and contingency flow rules provide for a largely unchanged flow regime for flows up to 100 ML/d. Field assessment undertaken by ELA (2012b) showed that at this level all key barriers downstream of the main proposed dam infrastructure are open to Eastern Freshwater Cod movement. In addition, flows in this range (base to moderate flows) provide for the other key environmental processes of fauna habitat provision, movement of smaller fish and other vertebrates, fine sediment flushing and water quality maintenance. Contingency flows potentially enhance the system by introducing flow pulses in periods where the current system had sustained low flows (ELA, 2012b).

Detailed assessment of the potential impacts of the proposed dam on the flow regime of the Rocky Creek system considering the proposed environmental flow regime and changes to the operation of other water supply resources was undertaken by ELA (2012b). The environmental flow regime provides a substantial mechanism to minimise the impacts of dam operation on the Rocky Creek system while maintaining the downstream environment. Whole-of-catchment solutions will also assist in mitigating impacts of the proposed dam. The conservation of native vegetation riparian zones, including the buffer zone surrounding the dam as well as the creeks that make up the Terania system (i.e. Rocky Creek, Tuntable Creek and Terania Creek) will help to maintain and improve water quality and habitat for aquatic species, including those identified threatened species (ELA, 2012b).

The environmental flows assessment also recommended that mitigation measures should be incorporated into environmental management plans relating to both construction and operation to manage impacts on the system as a result of the proposed environmental flow regime. Monitoring of hydrology, water quality and aquatic ecology during the pre-construction and operational phases of the project was also recommended.

The review of environmental flow regimes (Hydrosphere Consulting, 2020c) concluded the following in relation to Dunoon Dam:

- Previous assessment of environmental flows by ELA (2012b) followed a holistic approach incorporating multi-faceted ecosystem components and supported by field survey data and modelled flow data under a range of flow scenarios. The study was completed over 8 years ago but the methods employed remain valid and reflect contemporary environmental flow assessment methods.
- One exception was the reliance on a small number of benchmark fish species to establish environmental flow requirements. Further investigation of fish species within the subject site and connected aquatic environments is recommended to update species information and allow for a comprehensive assessment as to the suitability of the environmental flow regime proposed by ELA (2012b). This would include providing more information to determine whether the presence of key species used in determining environmental flows (e.g. Eastern Freshwater Cod) occur naturally or only exist through artificial stocking.
- Should Dunoon Dam be considered further as a future source, there may be opportunities for development of a balanced system of synergistic operating rules and environmental flow releases from RCD to Dunoon Dam, providing benefits for Rocky Creek in the reach between the two dams (approximately 8 km).

7.8 Cultural Heritage

A preliminary Heritage Impact Assessment was undertaken for the proposed Dunoon Dam (Ainsworth Heritage, 2013). The assessment was updated following a peer review (Australian Museum Business Services, 2012). A summary of the findings of the heritage assessment from Ainsworth Heritage (2013) is provided below.

Ainsworth Heritage (2013) reviewed the Aboriginal and non-Aboriginal history of the Dunoon area. Settlement of the area was undertaken first by the Widjabul people of the Bundjalung Nation, who were then displaced from the land by white settlers. The arriving white settlers first cleared and then cultivated the land for various crops, a process that has continued to the current day.

Based on the information gleaned from the research phase of the assessment, a field survey was undertaken which sought to identify and record both Aboriginal and Non-Aboriginal sites. Thirteen Non-aboriginal sites were located, which were assessed to have varying significance of a local nature. The most notable sites were the Depression era causeway and the Fraser Road and McPherson Homesteads. Numerous Aboriginal sites were located, consisting of scarred trees, grinding grooves, artefacts and a collection of burials. The collection of Aboriginal sites together is generally of State significance, allowing assumptions on how the Widjabul utilised and accessed the valley over time. Large sections of the dam area were inaccessible due to a combination of thick vegetation and steep terrain in conjunction with inclement weather patterns. The recommendations of the assessment have outlined where additional research will be required to ensure that any future impact is properly assessed and mitigated if the proposed dam is to go ahead.

Due to the nature of the proposed development, the vast majority of sites will undergo high impact which will result in the loss of most of the sites unless mitigation measures are put in place. As part of the review of the draft report, the views of both the Aboriginal Stakeholders and the wider community was sought in order to ensure that the management and mitigation measures, largely concerned with recording and recovery, are undertaken in consultation and conjunction with the relevant stakeholders. This is in accordance with OEH guidelines and will provide much greater certainty for the recommendations and conclusions of the report.

Non-Aboriginal heritage within the proposed dam site which would see high impact has been determined to be of little or no significance and presents no impediment to any future plans for the site. However, management recommendations have been developed by Ainsworth Heritage (2013b) for individual sites

Ainsworth Heritage (2013b) considers that there remains a risk that the approval of the proposed development may be refused on heritage grounds. The assessment recommends that further investigations of the burials with limited excavation is undertaken, subject to relevant approvals and not before all other water augmentation options have been considered. Areas for future assessment for Potential Archaeological Deposits (PADs) have also been identified. Continued consultation with Aboriginal stakeholder groups as to the best methods of protection for all identified sites is also required (Ainsworth Heritage, 2013).

Based on the inundation area (Figure 6), most cultural heritage sites are likely to be impacted through inundation for both the 20 GL and 50 GL storages (apart from the eastern-most site and the historic site to the south-east) although the elevation of the sites has not been documented. The two historic sites to the north may be outside the inundation area for the 20 GL dam. The Aboriginal marked trees in the dam infrastructure area could potentially be protected. Inundation of the sites with a smaller dam (FSL at lower elevation) has not been determined.

7.9 Secure Yield

NSW Urban Water Services (2013) assessed the yield benefit from the 20 GL and 50 GL Dunoon Dam for the current climate and 1ºC warming as part of the IWP process (Table 10).

Table 10: Increase in system secure yield with Dunoon Dam

Option	Historic climate (5/10/10)	Reduction factor[1]	1°C climate warming
20 GL Dunoon Dam	9,750	0.858	8,366
50 GL Dunoon Dam	20,450	0.858	17,546

Source: NSW Urban Water Services (2013)
1. Reduction factor was not calculated for the 20 GL option and the factor for the 50 GL option has been applied.

The secure yield will be re-assessed using the RCC Bulk Water Supply Security Model to optimise transfer and operating rules. The 2020, 2030 and 2060 secure yield of the Dunoon Dam options is shown in Figure 9, using a similar approach as for the current system (Section 5.2).

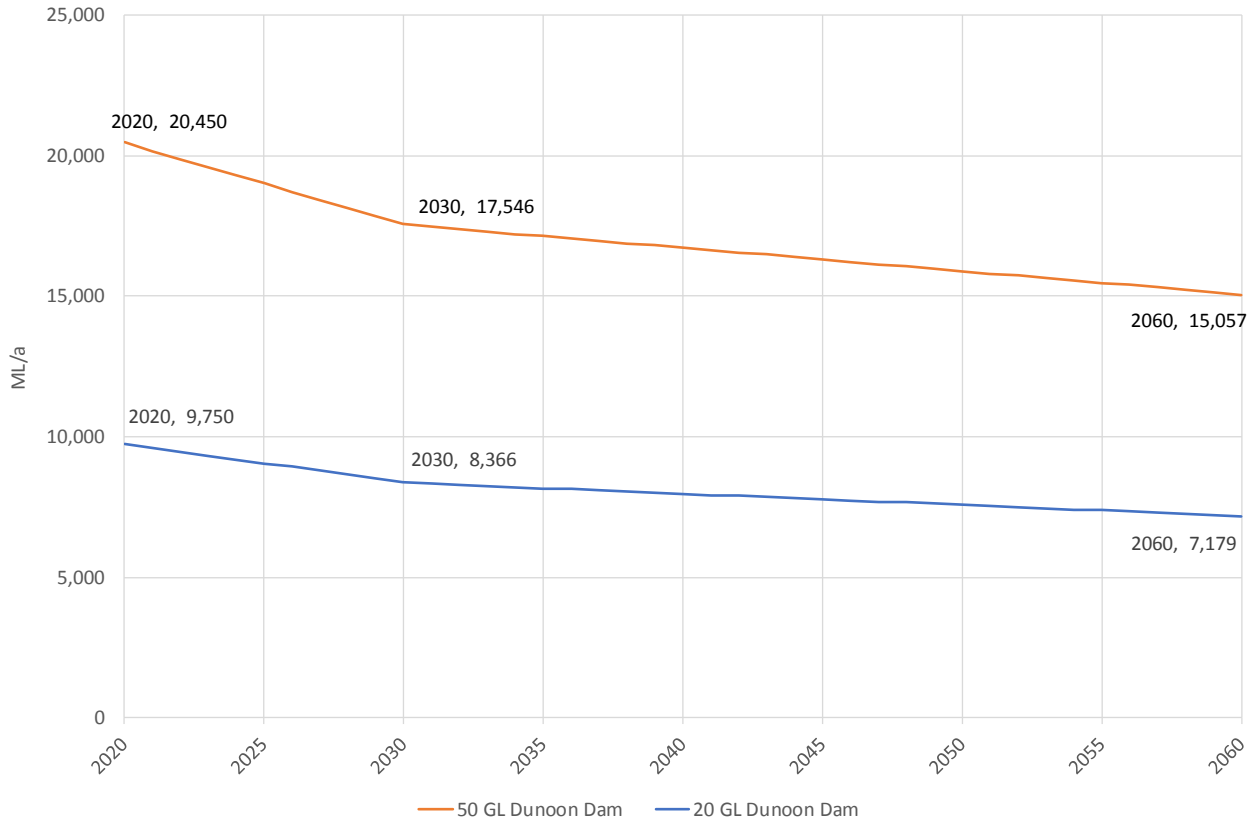

Figure 9: Secure yield estimates – Dunoon Dam options

7.10 Cost Estimates

Preliminary cost estimates have been developed by NSW Public Works Advisory (2020b) for the capital and operating costs of the 50 GL and 20 GL Dunoon Dam options as detailed in Table 11. Net present value (NPV) calculations are included in Appendix 1. The cost estimates for the 20 GL dam assume that it will be raised in future to a 50 GL dam (i.e. transfer systems and other infrastructure are sized for the 50 GL dam). The cost of a 20 GL dam without provision for the dam raising has not been estimated.

Table 11: Dunoon Dam preliminary cost estimate

Component	20 GL dam, (2020 $)	50 GL dam, (2020 $)
Roller compacted concrete dam	$80,473,250	$112,275,735
Pumping station	$16,091,790	$16,091,790
Rising main	$18,901,740	$18,901,740
Roadworks	$17,345,900	$17,345,900
Indirect costs	$55,384,835	$55,384,835
Total initial capital cost	$188,197,515	$220,000,000
Renewal costs (80 years)	$53,660,100	$54,280,200
Maintenance costs (80 years)	$11,750,275	$12,190,755
Operating costs (80 years)	$110,083,461	$110,515,416
Whole-of-life (80 years)	$363,691,351	$396,986,371
NPV (80 years @ 5%)	$204,345,989	$234,596,513
NPV (40 years @ 5%)	$196,325,548	$226,526,974
Yield benefit (2020 – 2060) ML/a	7,179	15,057
NPV/ML secure yield (40 years)	$27,347	$15,045

7.11 Data Gaps and Key Risks

To progress the development of the Dunoon Dam option, data gaps and risks need to be addressed as discussed in the following table. These would be undertaken as part of planning stages and would be completed prior to a decision to proceed with the planning and approvals for the dam option (outlined in Section 7.3).

Table 12: Data gaps and project risks – Dunoon Dam

Item	Discussion	Action required
Additional concept design	• Preliminary longitudinal elevation plans for the proposed rising main and construction and easement acquisition costs. • Infrastructure maintenance and renewal requirements. • Design basis for all aspects of the project to provide the basis for detailed design. • Destratification options. • Review of capacity of Corndale quarry to supply aggregate. • Dam amenities, site security landscaping and revegetation. • Confirmation of power supply arrangements. • Environmental monitoring requirements. • Construction strategy. • Procurement and contracting strategy. • Detailed project program.	RCC has commenced these investigations.
Dam break study	• Dam design in accordance with the latest (2019) Dam Safety Regulations and ANCOLD Guidelines.	RCC has commenced these investigations.

Item	Discussion	Action required
Road upgrade requirements	• Assessment of road transport network and road improvements required.	RCC has completed these investigations.
Cost estimates	• Review of total project (capital) cost estimations for both the 20 GL and 50 GL dam. • Peer review of capital and recurrent costings. • Identification of RCC costs. • Risk and opportunity assessment to identify contingency allowances.	RCC has commenced these investigations.
Hydrology	• Revised flood hydrology to provide updated loading on the dam structures for the dam break study with additional hydrographs to assess downstream flood impact. • A review of all hydrology in accordance with Australian Rainfall and Runoff (2016/2019). • Flood impact assessment.	RCC has commenced these investigations.
Mini hydropower	• Assessment of economic viability of downstream discharge structure to incorporate mini-hydroelectricity generation plant feeding power to the site and/or the electricity grid.	RCC has commenced these investigations.
Geotechnical investigations	• Comprehensive geotechnical investigations are required for the storage basin and the roller compacted concrete wall and all appurtenant structures to refine the geological model and to prove the properties of construction materials. • Geotechnical investigations are also required for the raw water rising main and new access road.	Detailed design stage - while the geotechnical conditions of the site represent significant risk to the project, the intrusive nature of the investigations precludes further work at this stage.
Community engagement	• Development and implementation of a community engagement strategy is required.	Strategy to be developed as part of Future Water Project 2060.
Survey	• Detailed survey of the pipeline route, access road and dam infrastructure locations is required. • Downstream development data would also be required for the dam break study.	Detailed design stage.
Detailed design	• Detailed design of all infrastructure. • An updated seismic hazard assessment and time history analysis should be obtained from the Seismic Research Centre from which appropriate earthquake load accelerations and parameters could be derived.	Detailed design phase
Biodiversity offset strategy	• Preparation of Biodiversity Development Assessment Report in accordance with *the Biodiversity Conservation Act, 2016*. • Review of offset requirements to include mitigation of potential impacts on aquatic and riparian habitat. • Development of an offset strategy and potential stewardship arrangements.	Specialist studies

Item	Discussion	Action required
Aquatic ecology and environmental flows	• A fishway is not currently included in the concept design. More detailed investigation of fish species within the subject site and connected aquatic environments, the interactions between the environmental flow regime, upstream and downstream environments and aquatic ecology is required. • Development of a balanced system of synergistic operating rules and environmental flow releases from RCD to Dunoon Dam may provide benefits for Rocky Creek in the reach between the two dams. • The ELA (2012b) recommends further study of the increase in the peak magnitude of flood events given that the current modelling of flow regimes that included RCD and Dunoon Dam at full capacity indicated that some flow events may lead to increased flood peaks above those that might have occurred in a natural regime. This model should include capacity to model water temperature, sediment and other water quality parameters to provide for a detailed hydro-dynamic assessment of the proposed dam. • Consultation with DPI-Fisheries.	Specialist studies
Buffer zone planning	• Land acquisition of buffer zone area. • Vegetation survey to confirm the level of rehabilitation work required in the area. • Development of management plans for the water quality protection areas and for the remaining catchment outside of the buffer zone. • Development of a water quality management system for the Rocky Creek/Dunoon Dam system.	Specialist studies
Cultural heritage	• Ainsworth Heritage (2013b) recommends that further investigations of the burials with limited excavation is undertaken, subject to relevant approvals and not before all other water augmentation options have been considered. • Areas for future assessment for PADS have also been identified. • Continued consultation with Aboriginal stakeholder groups.	Specialist studies

8. OPTION 2: MAROM CREEK WTP

8.1 Background

The Marom Creek water supply and WTP are owned and operated by BaSC. The Marom Creek water supply serves Meerschaum Vale, Wardell, Cabbage Tree Island and some rural customers. Water is sourced from a weir pool on Marom Creek. The water access licence entitles BaSC to extract 200 ML/a. The Ellis Road and Lindendale bores were formerly used to supply drinking water however they have been decommissioned. BaSC has existing licences to extract groundwater from these supplies (350 ML/a and 200 ML/a respectively).

Marom Creek WTP currently supplies a population of approximately 830 people with a maximum demand of up to 550 kL/d. The WTP has a capacity of 2.3 ML/d, limited by the capacity of the clear water pumps (CWT, 2018). The existing plant and raw water source have the capacity to supply the existing BaSC service area until 2036 (750 kL/d), however the WTP requires upgrading in order to be able to meet water quality targets. The existing surface water licence (548 kL/d) is sufficient to supply the current demand.

BSC has developed a 20-year Master Plan for the Marom Creek 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).

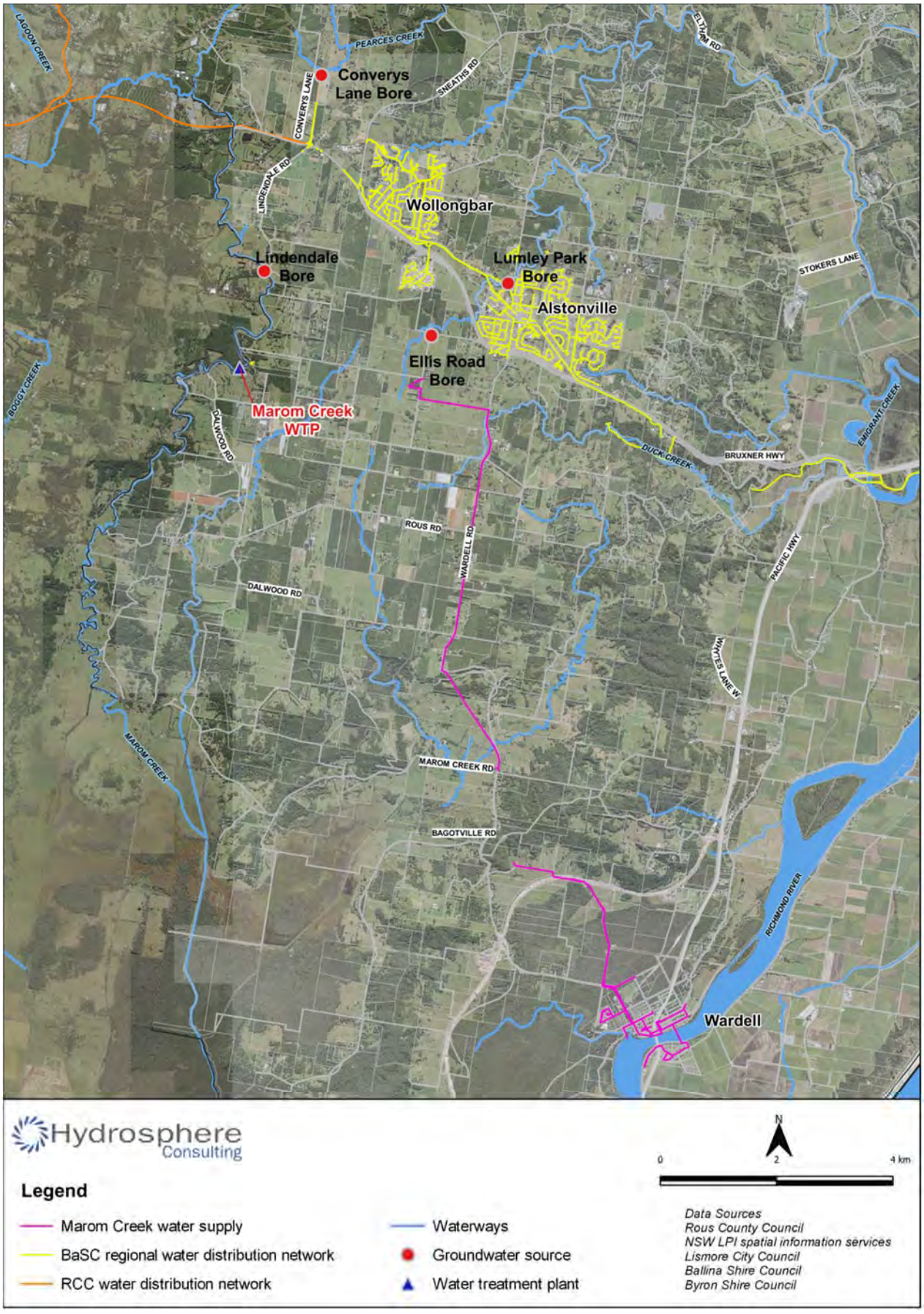

Figure 10: Marom Creek water supply

GIS data for the groundwater transfer and treated water distribution pipelines provided by BaSC appear to be incomplete.

8.2 Secure Yield

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). This study 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 (City Water Technology, 2018). The yield of the surface water with storage capacity of 66 ML with no limit on raw water transfer was found to be 417 ML/a, reducing to 299 ML/a with climate change (NSW Urban Water Services, 2017). However, the yield is limited by the existing licence limit of 200 ML/a. Source augmentation would be required to service other areas e.g. Alstonville or parts of Lismore. The existing yield of the Marom Creek water supply is shown on Figure 11.

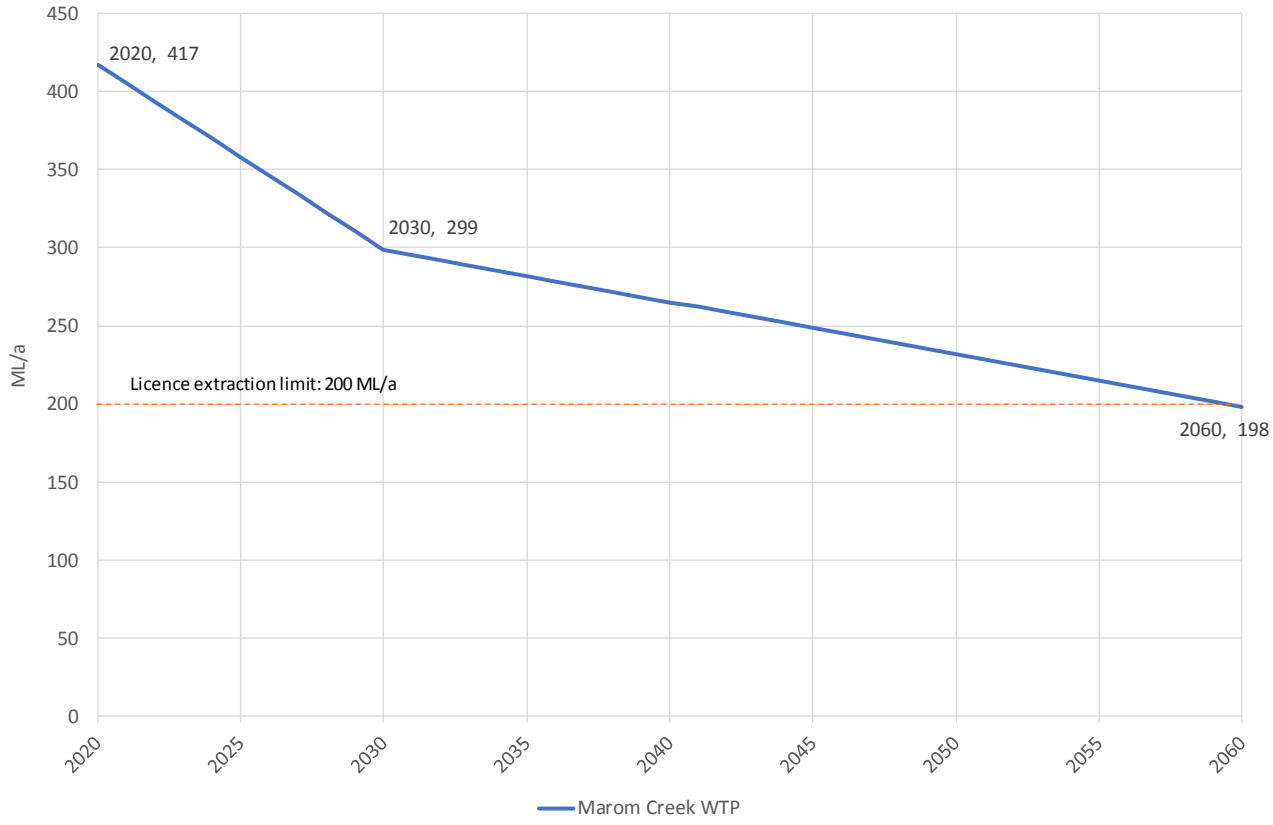

Figure 11: Secure yield estimates – Marom Creek

Options considered in the Master Plan (City Water Technology, 2018) 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 of Wardell, Alstonville and Wollongbar 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 (NSW Urban Water Services, 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 (not considering the existing licence limit or WTP capacity).

The option considered in this report involves transfer of the Marom Creek WTP to RCC with the excess capacity used to serve Alstonville, Wollongbar and potentially Lismore. The current spare capacity of the WTP is 0.8 ML/d (198 ML/a). Future augmentation of the Marom Creek WTP is possible (e.g. to 4.3 ML/d as proposed by CWT (2018)). This relies on increasing the surface water licence limit to supply the extra raw water demand. WTP upgrades would also be required to meet water quality requirements.

8.3 Cost Estimates

Preliminary cost estimates have been developed by CWT (2018) for the capital and operating costs of the Marom WTP upgrade as detailed in Table 13. NPV calculations are included in Appendix 1.

Table 13: Marom Creek WTP upgrade preliminary cost estimate

Component	Cost Estimate (2020 $)
Engineering	$1,831,750
WTP upgrade	$7,327,000
Total initial capital cost	$9,158,750
Renewal costs (80 years)	$5,641,791
Maintenance costs (80 years)	$49,365,702
Operating costs (80 years)	$19,402,383
Whole-of-life (80 years)	$83,568,626
NPV (80 years @ 5%)	$24,561,843
NPV (40 years @ 5%)	$22,088,688
Yield benefit (2020 – 2060) ML/a	198
NPV/ML secure yield (40 years)	$111,559

8.4 Data Gaps and Key Risks

To progress the development of the Marom Creek option, data gaps and risks need to be addressed as discussed in the following table. These would be undertaken as part of planning stages and would be completed prior to a decision to proceed with the planning and approvals for the option.

Table 14: Data gaps and project risks – Marom Creek

Item	Discussion	Action required
Licence limit	Increased extraction limit will be required to meet future demand	RCC has had preliminary discussions with DPIE – Water which indicate that it will be possible to increase the extraction limit. Further liaison with DPIE-Water is required.
Asset ownership	Assets are currently owned by BaSC.	RCC will liaise with BaSC regarding the potential for transfer of assets.
Secure yield	• Existing system – storage volume is to be confirmed and yield to be re-assessed if required. • Groundwater options – requires assessment. • Weir raising – requires re-assessment following detailed storage survey. • Optimisation of yield with connection to existing regional supply.	RCC will liaise with BaSC regarding the investigations required.
Concept development	Confirmation of water source, WTP, service area and transfer system concept.	RCC will liaise with BaSC and regulatory agencies regarding the investigations required.
Community engagement	Development and implementation of a community engagement strategy is required.	Strategy to be developed as part of Future Water Project 2060.
Detailed design	Detailed design of all infrastructure.	Detailed design phase
Cost estimates	Review of total project cost estimates	Detailed design phase

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9. OPTION 3: GROUNDWATER

9.1 Background

Detailed investigations into the identification and assessment of groundwater sources were undertaken in 2015 (Jacobs, 2015a; Jacobs, 2015b; Jacobs, 2015c; Jacobs, 2015d; Jacobs, 2015e) to review the available data and information on regional groundwater sources. Based on an assessment of the geology and hydrogeology, the initial studies identified three areas with the potential to host groundwater supply schemes at North Lennox Head-Newrybar (coastal sands aquifer), Woodburn (coastal sands aquifer) and Dunoon (basalt). In 2016, three stages of drilling programs were undertaken in these three areas to further investigate the groundwater yields and water quality (Jacobs, 2017a; Jacobs, 2017b; Jacobs, 2017c). As a result, the investigations were expanded to include the Tyagarah area and the basalt aquifer in the Alstonville area. Further desktop, surface geophysical and hydrogeological investigations of the areas identified at Tyagarah and Newrybar were undertaken to identify the areas with the potential to provide groundwater supply (Groundwater Imaging, 2017).

The final locations for groundwater supply options have been identified in the detailed investigations as follows:

1. Woodburn.
2. Newrybar.
3. Tyagarah.
4. Alstonville.

The water quality risk assessment carried out for each of these areas provided guidance for development of these options including the appropriate drinking water treatment processes that should be applied in each area to deliver water that complies with the Australian Drinking Water Guidelines and the level of risk mitigation required to address the potential hazards identified due to the location of the bores and the nature of the borefield recharge areas.

9.2 Environmental, Land Use and Heritage Considerations

Jacobs (2015b) provided a high-level review of environmental, land use and heritage issues within the study area to provide context to potential source areas and schemes. Issues covered included:

- Planning and statutory requirements – there were no issues identified that would present a risk to approvals for investigation or development stages for the final locations.
- Land contamination – no areas of contamination were identified that would make the final sources unsuitable as a source of water.
- Heritage – potential impacts on known heritage sites were considered.
- Environmental issues that may impact on the sustainability of different sources. Environmental issues considered for the development of the permanent bores were:
    - Potential impact on groundwater dependent ecosystems (GDEs) and flows in waterways where groundwater contributes significantly. While these impacts can generally be managed, potential impacts were avoided.
    - Proximity to acid sulphate soil areas – lowering of groundwater tables may result in the oxidation of these soils and associated impacts.

- Direct and indirect impacts of supporting infrastructure to permanent bores. This includes pipelines to connect the bores to regional water reticulation networks, pumping stations, water treatment facilities etc. In terms of direct impacts, the supporting infrastructure may have more substantial impacts than the actual bore infrastructure. This may include impacts on threatened ecological communities, flora and fauna, Aboriginal heritage and cultural sites, non-Aboriginal heritage sites, acid sulphate soils and sensitive receptors for noise and waterways

Jacobs (2015d) provided a multi-criteria assessment of all potential groundwater options considering the impact on GDEs at the proposed depth, the likelihood of increasing acid sulfate soil risk and known heritage issues. The results of the assessment for the Woodburn, Newrybar, Tyagarah and Alstonville options are summarised in Table 15. Further assessment will be required, however significant impacts can be avoided through site selection.

Table 15: Environmental and heritage assessment outcomes – groundwater options

Criteria	Woodburn	Newrybar	Tyagarah	Alstonville
Impact on GDEs at the proposed depth	Few GDEs but impacts manageable	Some GDE impacts, management unknown	Several GDEs, management difficult	Some GDE impacts, management unknown
Likelihood of increasing acid sulfate (ASS) soil risk	Medium probability of ASS <3m. Receptors >300m distance. Management required	Low probability of ASS <3m. Receptors >500m distance. Minor management required	Medium probability of ASS <3m. Receptors >300m distance. Management required	No known ASS to occur, no nearby receptors, no management required
Known heritage issues	No listed heritage sites, no management required	Known heritage in source area but impacts can be managed	No listed heritage sites, no management required	Some heritage areas but not adjacent to bore sites, no management required

Source: Jacobs (2015d)

The groundwater options are discussed in the following sections.

9.3 Option 3-1: Woodburn

There is an existing bore supply at Woodburn consisting of three bores (No. 1, No. 2 and No. 3) in the coastal sands aquifer which augments the supply to the Lower Richmond River supply area (Woodburn, Broadwater, Evans Head and Coraki) during dry periods (Section 3). In 2007/08 the borefield produced 46 ML. The existing borefield has a licence entitlement of 726 ML/a. Bores 1 and 2 have been compromised by the development of the Pacific Highway and are no longer used. Bore 3 has been replaced and is used as an emergency supply.

Based on the findings of the initial groundwater investigations, desktop investigations were undertaken for a potential new borefield scheme at Woodburn. Jacobs (2017d) provided preliminary aquifer modelling and determined borefield production estimates for the coastal sands aquifer in the Woodburn area and found that the Woodburn aquifer is capable of supplying the 2060 annual day demand for the 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 and capital cost estimate have been prepared for the scheme (Jacobs, 2018b).

The concept design for the Woodburn borefield includes four production bores (existing No. 3 and new No. 4, No. 5 and No. 6) which would operate 22 hours per day at 16 L/s providing a maximum borefield capacity of 5.0 ML/d. Bore pumps would be designed to operate with a 10 m maximum draw down in each bore (Jacobs, 2018b).

Treated water would be transferred to the existing Lower Richmond River supply system. The groundwater WTP would be located on the site of the existing chlorination facility and have a daily production capacity of 5.0 ML/d (Figure 12). The WTP would require the following treatment processes:

- Aeration unit with provision for pre-chlorination.
- Pre lime dosing for pH correction and alkalinity (if necessary) for reliable coagulation.
- Chemical coagulation with alum and flocculation.
- Upflow clarification to settle and remove floc (as waste sludge).
- Filtration of clarified water through multi-media gravity filter with filter air and water backwash.
- Collection of clarifier waste sludge and filter backwash water to enable recovery of washwater for blending.
- Thickening and disposal of sludge.
- UV disinfection designed for 4.0 log removal for Cryptosporidium.
- Post soda ash dosing for pH correction, and fluoridation.
- Chlorination to provide effective disinfection and a free chlorine residual to protect the treated water transfer system against recontamination.

If required ozonation and biologically activate carbon (BAC) filtration would be included between filtration and UV disinfection as a barrier to potential organic pollutant and taste and odour precursors.

Figure 12: Woodburn groundwater WTP inlet and layout

Source: Jacobs (2018b)

9.4 Option 3-2: Newrybar

Two options for groundwater supply at Newrybar have been identified (north and south) which may be combined to reduce capital costs. Concept designs and cost estimates for the Newrybar groundwater scheme are provided in Jacobs (2020b). The groundwater supply from these two sources would be combined with existing supplies to the Knockrow reservoir.

Based on the results from test bores in the vicinity, the total dissolved solids (TDS) of the water drawn from continuous operation of bores at the Newrybar south site would be around 5,000 mg/L resulting in the need for brackish water desalination of the groundwater to produce drinking water quality. The groundwater would require conventional treatment to clarify the water before reverse osmosis (RO) to remove salinity (Jacobs, 2020b). The method and costs associated with waste disposal from this treatment process have not yet been determined.

Up to 5 production bores and a standby bore each capable of producing 15 L/s (75 L/s in total) for a period of 22 hrs/day resulting in a daily brackish groundwater production of capacity of 6.0 ML/d from the south borefield. The estimated final output is 5.4 ML/d of drinking water discharged to the Knockrow reservoir and 0.6 ML/d of brine. A supply of low TDS groundwater is proposed in north Newrybar from 5 production bores and one standby bore each capable of producing 5 L/s (25 L/s in total) for 22 hrs/day with a daily production capacity of 2.0 ML/d. It is proposed to combine the two borefield supplies with treatment at a single WTP. The integrated Newrybar groundwater scheme would require a WTP comprised of a conventional clarifier and RO.

9.5 Option 3-3: Tyagarah

Concept designs and cost estimates for the Tyagarah groundwater scheme are provided in Jacobs (2020b). There are two schemes which have been identified for utilising the groundwater produced at Tyagarah. Scheme 1 would transfer the treated groundwater to the Ocean Shores reservoirs (Saddle Road, Yamble and Warrambool) and Rous retail customers and Scheme 2 to the St Helena reservoir.

Jacobs (2020b) considered that the schemes could be constructed in two stages:

- Scheme 1:
    - Stage 1 - supply 6.4 ML/d of treated water from four production bores and one standby bore. Groundwater treated at a new WTP with the capacity to treat both stages.
    - Stage 2 - construction of an extra bore to supply 7.5 ML/d.
- Scheme 2:
    - Stage 1 - supply 10.8 ML/d of treated water from six production bores and one standby bore. Groundwater treated at a new WTP with the capacity to treat both stages.
    - Stage 2 - construction of an extra bore to supply 12.5 ML/d

The option considered in this report includes initial construction of Scheme 1, stage 1 with future expansion to include Scheme 2 with an ultimate capacity of 12.5 ML/d. The future scheme would supply all of the Byron Shire apart from Bangalow with treated water distributed to the Ocean Shores reservoirs, retail customers along the Brunswick 300 trunk main and St Helena reservoir (servicing Byron Bay and Rous retail customers).

9.6 Option 3-4: Alstonville

The existing Alstonville borefield consists of 2 production bores, one at Lumley Park and one at Converys Lane which extract groundwater from fractured basalt to augment supply during dry periods (Section 3). This option proposes that the bore at Lumley Park be retained while the bore at Converys Lane would be replaced with a new bore adjacent to the existing bore. Concept designs and cost estimates for the Tyagarah groundwater scheme are provided in Jacobs (2020b). The two bores would operate 22 hours per day and a minimum of 320 days per year. This option proposes the construction of a standby bore at Elvery Lane to provide operational security. The existing water licence for the Converys Lane bore can be transferred to the replacement bore providing it is constructed within 20m of the existing bore. A new WTP and a transfer pump station and pipeline to transfer the groundwater to the Wollongbar reservoir would be required. The estimated long-term capacity of the two bores is 4.5 ML/d

Jacobs (2020b) also considered the option of utilising the existing Marom Creek WTP (refer Section 8) to treat groundwater from the Alstonville borefield. The existing Marom Creek surface water supply would be blended with the groundwater supply. Cost savings would be achieved by utilising the existing Marom Creek WTP and the existing pipeline from the Marom Creek WTP to Wollongbar reservoir (not presently used) to transfer groundwater to the WTP. A new pipeline from the Marom Creek WTP to Wollongbar reservoir would be required.

The option considered in this report is the new bores (CL1 and AL2) at Wollongbar and Alstonville, with groundwater transferred to the Marom Creek WTP with distribution to customers from the Wollongbar reservoir.

9.7 Summary of Groundwater Options

9.7.1 Borefield and WTP capacity

A summary of the four groundwater options considered in this report is given in Table 16.

Table 16: Summary of groundwater options

Borefield	Groundwater inflow to WTP (ML/d)	WTP capacity (ML/d)	Treatment process
Woodburn	5.0	5.0	Conventional
Integrated Newrybar	8.0	7.2	Conventional and RO
Tyagarah (Scheme 1, Stage 1)	7.5	6.4	Conventional
Tyagarah (Scheme 2)	13.9	12.5	Conventional
Alstonville	4.5	4.0	Conventional

Source: adapted from Jacobs (2020b)

9.7.2 Secure yield

The secure yield of the groundwater schemes has been assessed using the RCC Bulk Water Supply Security Model (Engeny, 2020) with results shown in Table 17. The 2020, 2030 and 2060 secure yield of the groundwater options is shown in Figure 13, using a similar approach as for the current system (Section 5.2).

Table 17: Increase in system secure yield with groundwater schemes

Option	Historic climate (5/10/10)	Reduction factor[1]	1°C climate warming
Woodburn	800	0.932	745
Integrated Newrybar	2,100		1,956
Tyagarah (Scheme 1, Stage 1)	2,050		1,910
Tyagarah (Scheme 2)	3,950		3,679
Alstonville	1,050		978

Source: Engeny (2020).
1. Reduction factor was only calculated for the combined groundwater schemes and has been applied to each scheme.

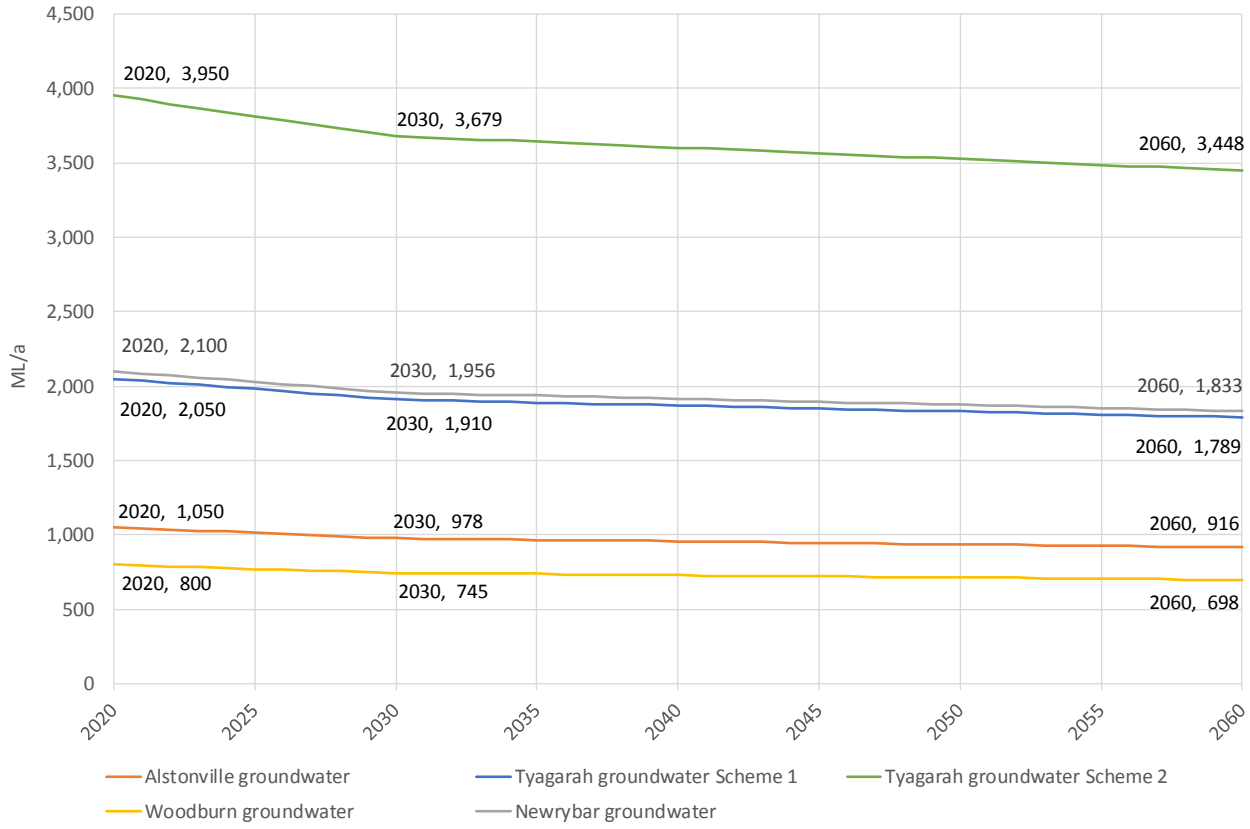

Figure 13: Secure yield estimates – groundwater options

9.7.3 Cost estimates

Preliminary cost estimates for each groundwater option have been provided by Jacobs (2020b) as detailed in Table 18. NPV calculations are included in Appendix 1.

Table 18: Groundwater preliminary cost estimate

Component	Woodburn (2020 $)	Integrated Newrybar (2020 $)	Tyagarah (Scheme 1, Stage 1) (2020 $)	Tyagarah (Scheme 2) (2020 $)[1]	Alstonville (2020 $)
Pre-construction costs	$3,812,000	$14,535,000	$11,355,000	$2,930,000	$7,612,000
Construction costs	$31,685,000	$47,160,000	$37,250,000	$25,206,250	$31,190,000
Integration costs	$985,000	$1,460,000	$1,175,000	$635,000	$985,000
Total initial capital cost	$36,482,000	$63,155,000	$50,852,000	$30,462,250	$25,941,000
Renewal costs (80 years)	$67,928,077	$79,534,935	$96,773,395	$127,695,494	$67,433,077
Maintenance costs (80 years)	$13,104,300	$18,984,800	$9,242,510	$23,261,600	$4,546,510
Operating costs (80 years)	$52,288,000	$113,316,000	$72,420,960	$108,479,120	$45,843,200
Whole-of-life (80 years)	$169,802,377	$274,990,195	$229,288,865	$277,659,139	$143,763,787
NPV (80 years @ 5%)	$55,817,346	$98,566,607	$76,008,100	$70,231,337	$44,109,829
NPV (40 years @ 5%)	$51,230,292	$91,091,988	$69,888,062	$61,558,652	$40,065,265
Yield benefit (2020 – 2060) ML/a	698	1,883	1,789	3,448	916
NPV/ML secure yield (40 years)	$73,396	$49,696	$39,065	$38,213	$43,739

1. RCC has adjusted costs presented in Jacobs (2020b) to allow for the staged construction of the Tyagarah scheme. The ultimate scheme would provide a yield benefit of 3,448 ML/a with costs from both stages.

9.8 Data Gaps and Key Risks

To progress the development of these four groundwater options, the items outlined in Table 19 should be addressed by RCC. These would be undertaken as part of planning stages and would be completed prior to a decision to proceed with the planning and approvals for the groundwater options.

Table 19: Data gaps and project risks – groundwater

Item	Discussion	Action required
Concept development	Further bore testing to confirm the sustainable yields, impacts on other water users within the aquifers and water quality.	Bore testing
Wastewater disposal	Development of options for disposal of brine waste from Newrybar RO plant.	Concept development
Concept design	Concept designs for Newrybar, Tyagarah and Alstonville groundwater options (bores, collector systems, treatment and integration with existing network) are required.	Concept designs
Detailed design	Detailed design of all infrastructure.	Detailed design phase
Cost estimates	Review of total project cost estimates.	Detailed design phase
Environmental investigation	Detailed investigation of the environmental impacts of bore construction and associated infrastructure.	Specialist studies
Land acquisition	• Assessment of property acquisition costs (land and administration charges) under the *Land Acquisition (Just Terms Compensation) Act 1991*. • Subsequent purchase of land.	Land valuation and acquisition
Community engagement	Development and implementation of a community engagement strategy is required.	Strategy to be developed as part of Future Water Project 2060.

10. OPTION 4: DESALINATION

Desalination is the process of removing salt and other minerals from water. Desalination of seawater provides an unlimited, climate independent and reliable new water supply. However, energy consumption is very high.

10.1 Site and Treatment Options

Detailed investigations into desalination investigations were undertaken by GANDEN (2020). The investigations included a review of previous studies, confirmation of plant capacity and identification and assessment of potential locations of the plant considering network connectivity, power supply, social and environmental factors. Various desalination technologies, intake and outlet structures were considered. Single facilities of 5-10 ML/d capacity were considered to ensure economic viability.

The following three potential site locations were identified for the assessment based on previous information and in consultation with RCC:

- Byron Bay (adjacent to the existing West Byron wastewater treatment plant (WWTP)).
- Lennox Head (adjacent to the existing WWTP).
- South Ballina.

These locations were selected based on the following considerations:

- Proximity to seawater sources.
- Water supply demand in areas of large population growth or existing high population to justify the capital expenditure.
- Proximity of electrical infrastructure and water reticulation networks that can support the proposed facilities.

The opportunities, risks and constraints identified for each location in the desktop study are outlined in Table 20.

Table 20: Risk and opportunities of different desalination plant locations

Location	Opportunities	Risks and Constraints
Lennox Head	Location of large population growth. Likely good access to land adjacent to existing WWTP. Co-location of existing WWTP ocean outfall. Simple to connect to power.	Expensive to connect intake underneath Skennars Head properties. Connection to East Ballina reservoirs would be required as current population does not warrant a new 5 – 10 ML/d plant. Emigrant Creek WTP and Knockrow reservoir already provide more supply redundancy than other LGAs (e.g. Byron Shire).

Location	Opportunities	Risks and Constraints
South Ballina	Large baseline population in Ballina Shire. Cheaper land compared to alternative locations. 5 ML/d would serve current population and 10 ML/d would serve Ballina, Skennars Head and Lennox Head.	Expensive to connect power and treated water pipeline across the Richmond River, adding $5.0 - $10 million using horizontally direct drilling. Would require connection to Skennars Head and Lennox Head to justify 10 ML/d capacity. Location at risk of inundation and being isolated during floods. Intake/outfall in area of high erodibility. Water quality risk due to flood waters creating sediment plume at the Richmond River mouth. Additional expense to extend intake/outfall past observed Richmond River sediment plume.
Byron Bay	High demand area with high population growth. RCC may operate the facility to deal with additional potable demand associated with seasonal events and tourism influx. Simple connection to existing electrical infrastructure and potable water mains. No perceived risk of flood inundation.	Potentially expensive building envelope. Tyagarah Nature Reserve runs along coast and is highly sensitive to erosion. Community perception would need to be managed carefully.

Source: GANDEN (2020)

Based on the risks and opportunities identified in Table 20, Byron Bay was chosen as the preferred location as it located in an area with large projected growth with the future projected demand of the wider area (Byron Bay, Suffolk Park, Ocean Shores, Brunswick Heads and Bangalow) predicted to grow to 11 ML/d by 2036 making it a suitable area to be served by a 10 ML/d desalination plant (Figure 14). Furthermore, the site is located close to power supplies and the existing water reticulation network (GANDEN, 2020).

Multi-criteria analysis was undertaken to compare a range of desalination technologies and a range of seawater intake technologies able meet the following three mandatory criteria:

- Achieves water quality objectives (i.e. will meet the Australian Drinking Water Guidelines).
- Possible to implement in Rous regional supply area.
- Practical to implement in Rous regional supply area.

The MCA assessed the technologies on their whole life cost, proof of the technology, resourcing, support and process resilience (considering environmental changes such as beach erosion, salinity and turbidity resulting from heavy rain) and their value for money. Seawater Reverse Osmosis (SWRO) was chosen over Electrodialysis Reversal as the preferred desalination technology. Offshore Open Intake was chosen over a Subsurface Ranney Collector as the preferred seawater intake technology. Other desalination (nanofiltration, Capacitive Deionisation/ Membrane assisted Capacitive Deionisation, Ion exchange and thermal and solar distillation) and seawater intake technologies were assessed by GANDEN (2020) however they did not meet the mandatory criteria.

Figure 14: Proposed desalination plant location in Byron Bay

Source: GANDEN, 2020

A cost comparison was used to compare conventional pre-treatment (coagulation-flocculation-media filtration) and microfiltration (MF) and ultrafiltration (UF) systems. MF/UF filtration was provisionally recommended by GANDEN (2020) however the report acknowledges this preference is based on limited data on feedwater quality.

10.2 Preliminary Concept Design

A concept design layout and cost estimates were provided by GANDEN (2020) for the preferred option which includes a seawater desalination plant with a production capacity of 10 ML/d. The plant would be constructed in stages of 5 ML/d initially followed by two incremental increases of 2.5 ML/d to achieve the ultimate capacity of 10 ML/d.

The preliminary concept design was developed by GANDEN using Suez Water Technologies & Solutions' 'skid-based' technology to allow for a staged construction approach. The concept design comprises the following components:

- Ocean offshore seawater intake system.
- Pre-treatment screens.
- Chemical dosing.
- UF/MF pre-treatment filtration.
- 4 x 2.5 ML/d scalable 'SeaPAK' (A Suez Water product) trains.
- High pressure pumps, membrane pressure vessels and energy recovery devices.

- Post treatment systems, including pH adjustment and fluoridation requirements.
- Backwash wastewater settling tank, belt press and sludge disposal systems.
- Brine outfall systems.
- Building and amenities.

The concept design for the seawater intake and waste outfall has not been finalised as these are dependent on the final site selection. However, as they would be located in the Cape Byron Marine Park, potential impacts and approval requirements would need to be addressed. The intake would most likely comprise a directionally drilled pipeline with a dual intake/outfall system.

Chemicals such as sodium hypochlorite, anti-scalant, biocide, sodium bisuplphite, sulphuric acid, remineralisation chemicals and 'clean in place' solution are required for dosing and would be stored in either 20 L drums, itemised bulk containers or small tanks and directly dosed from the storage device. Disinfection of the treated water would be undertaken at the treated water reservoir/chlorine contact tank. Concentrate disposal would be achieved by depositing the reject concentrated brine water though the outfall system and hence treatment chemicals would be selected to allow for environmental discharge (to be confirmed during detailed environmental assessment and monitoring). Pre- filtration of the intake water would be achieved using membrane ultrafiltration. Cartridge filters would be situated between the UF units and RO membranes to act as a second line of defence in case of UF filtration failure.

The SWRO membranes would be fixed inside fiberglass reinforced plastic pressure vessels (normally between 5 and 7 membranes per vessel). Multiple pressure vessels would be located on a rack, called "arrays" or modules. The RO permeate would then be transferred to post treatment and the concentrate to disposal via an ocean outfall. The feed water would pass through the RO membranes once (i.e. a one-pass system) to produce approximately 40% RO permeate and 60% concentrate. Approximately 252 membranes and 36 RO pressure vessels would be required for each 2.5 ML/d train.

The desalination plant concept design is shown in Figure 15. The concept design includes future filtration and RO membranes which would be installed when the capacity of the plant is required to be increased.

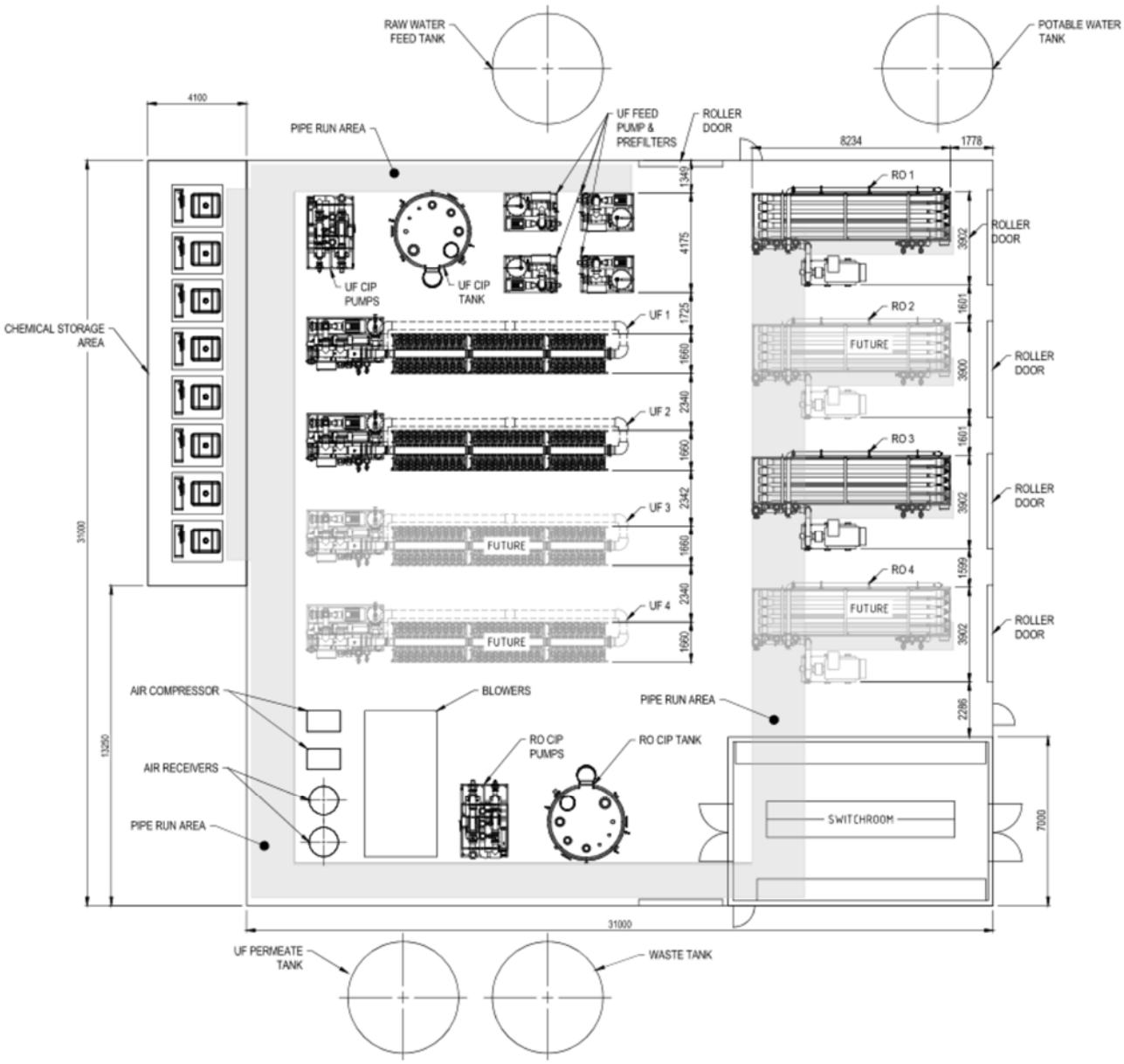

Figure 15: Concept design plant layout

Source: GANDEN, 2020

10.3 Environmental and Social Considerations

Desalination schemes that have been implemented in Australia have generally been met with significant community resistance and criticism (GeoLink, 2011, GANDEN, 2020). GeoLink (2011) suggested that for a desalination scheme in the Rous supply area to be accepted by the community, a multi-criteria assessment that is effectively communicated to the community would be necessary.

A desalination option was included in the IWP (MWH, 2014) which identified desalination as a potential new source to be considered as a safeguard should other sources prove unviable and insufficient. The IWP included desalination as a future component in a scenario in combination with groundwater sources to be implemented when demand exceeded the additional supply provided by the groundwater sources.

Based on a review of existing literature GANDEN (2020) identified and documented the following environmental challenges and potential impediments associated with developing desalination facilities:

- Potential ecological impacts associated with seawater intakes.

- Potential environmental and ecological impacts associated with brine discharge.
- Potential environmental impacts on coastal land.
- Native title considerations.
- Energy consumption.

An environmental impact assessment would be required to assess environmental conditions and establish design parameters. A Marine Parks permit would be required to construct an intake/outfall pipeline at the Byron Bay site (permissibility of this activity has been assumed).

The *Northern Rivers Regional Bulk Water Supply Study* (Hydrosphere Consulting, 2013) found that the incorporation of marine water desalination would be an attractive source augmentation option for a regional scheme (including interconnection with the Tweed Bray Park system) as this is easily scalable to match demand and is independent of climate, thus providing a highly secure water supply. Desalination provides climate independence that is currently missing from the region's water supplies. Desalination schemes have been successfully developed elsewhere and improvements in technology are likely to improve the attractiveness in future.

10.4 Secure yield

The secure yield of the desalination option has been assessed using the RCC Bulk Water Supply Security Model (Engeny, 2020) with results shown in Table 21.

Table 21: Increase in system secure yield with desalination

Option	Historic climate (5/10/10)	Reduction factor[1]	1°C climate warming
Desalination (10 ML/d)	1,550	1.0	1,550

Source: Engeny (2020).
1. Desalination is independent of climate.

10.5 Cost Estimates

The capital cost for the proposed plant was developed by GANDEN (2020) by benchmarking against a desalination plant in Agnes Waters as the most representative example of a similar sized desalination project executed in Australia (Table 22). NPV calculations are included in Appendix 1.

Table 22: Desalination preliminary cost estimate

Component	Cost Estimate (2020 $)
Stage 1 – 5 ML/d capital cost	$47,000,000
Stage 2 – 2 x 2.5 ML/d capital cost	$7,000,000
Renewal costs (80 years)	$36,794,547
Maintenance costs (80 years)	$20,765,000
Operating costs (80 years)	$103,138,940
Whole-of-life (80 years)	$214,698,487
NPV (80 years @ 5%)	$84,662,855
NPV (40 years @ 5%)	$78,991,236
Yield benefit (2020 – 2060) ML/a	1,550

Component	Cost Estimate (2020 $)
NPV/ML secure yield (40 years)	$50,962

10.6 Data Gaps and Key Risks

To progress the development of Byron Bay desalination option, the items outlined in Table 23 should be addressed by RCC. These would be undertaken as part of planning stages and would be completed prior to a decision to proceed with the planning and approvals for the desalination options.

Table 23: Data gaps and project risks – Byron Bay desalination

Item	Discussion	Action required
Location	Further investigation is required to confirm the most suitable plant location including further environmental assessment.	Detailed design phase
Integration	Further assessment of network integration and electrical headworks is required.	Detailed design phase
Cost estimates	Review of total project cost estimates.	Detailed design phase
Environmental investigation	Investigation of the environmental impacts	Specialist studies
Marine Park impacts	Investigation and consultation regarding impacts on Cape Byron Marine Park and approvals required.	Specialist studies
Land acquisition	• Assessment of property acquisition costs (land and administration charges) under the *Land Acquisition (Just Terms Compensation) Act 1991*. • Subsequent purchase of land.	Land valuation and acquisition
Community engagement	Development and implementation of a community engagement strategy is required. RCC considers that community opposition to desalination on the basis of high energy consumption is a significant risk.	Strategy to be developed as part of Future Water Project 2060
Detailed design	Detailed design of all infrastructure.	Detailed design phase

11. OPTION 5: INDIRECT POTABLE REUSE

11.1 Indirect Potable Reuse Scheme Options

This option involves reusing advanced treated wastewater effluent by transferring it to the surface water sources. The feasibility of indirect potable reuse (IPR) options was explored in a desktop study which considered opportunities to reuse wastewater effluent to reduce or replace potable water demand within the bulk supply area (CWT, 2020). The study considered the following six WWTPs for their potential to provide effluent for water reuse:

- Ballina WWTP (BaSC).
- Lennox Head WWTP (BaSC).
- Alstonville WWTP (BaSC).
- Bangalow WWTP (BySC).
- South Lismore WWTP (LCC).
- East Lismore WWTP (LCC).

CWT considered the current wastewater production, existing recycled water schemes and the location of each of the plants to consider how a reuse scheme could be configured. The potential quantity of source wastewater provided by each WWTP is provided in Table 24.

Table 24: Current wastewater production and recycling levels at WWTPs

Treatment plant	Annual Wastewater production (ML)	Current water reuse scheme	Current reuse rate/amount	Additional wastewater yield
Ballina WWTP	2,400 – 3,400	Dual reticulation recycled water scheme	NA	1,300 ML/a[1]
Lennox Head WWTP	1,400 – 1,700		10-80%	
Alstonville WWTP	600 – 750	Local recycled water scheme	Average- 50% Dry weather periods- 70-90%	70-120 ML/a[2]
Bangalow WWTP	140 - 170	Previous scheme- recycled water for bamboo crop irrigation	0% Previously 13%	70-110 ML/a[2]
South Lismore WWTP	NA	None	0	2,700 ML/a[1]
East Lismore WWTP	NA		0	

Source: CWT (2020), MWH (2014)

1. These values were assumed in the IWP process (MHW, 2014) but should be confirmed through further investigation.

2. These values have been estimated by CWT.

3. LCC data were not provided for the study.

Based on the potential additional yield, Ballina and Lennox Head (combined) and South Lismore and East Lismore (combined) were considered to be potential options for providing source effluent. The treated effluent from these sources may be transferred to a potable water supply source (ECD or Wilson River Source) where it would be further treated in an advanced water recycling plant (AWRP) or the existing

WWTPs could be upgraded and the effluent treated to a high standard before being transferred to the water supply source. Table 25 outlines the potentially feasible schemes for utilising these effluent sources to provide additional potable water supply (CWT, 2011). Cost estimates have not been prepared for the schemes.

Table 25: Summary of potentially feasible scheme options

Water source	Scheme description	Source(s)	Infrastructure cost
WRS	Pump treated effluent to WRS at treat in a common AWRP	East Lismore and South Lismore WWTP	High
	Individual AWRP upgrades at existing WWTPs then pumping recycled water to WRS	South Lismore WWTP	High
		East Lismore WWTP	High
ECD	Pump treated effluent to ECD and treat in a common AWRP	Ballina and Lennox Head WWTP	High
	Individual AWRP upgrades at existing WWTPs then pump recycled water to ECD	Ballina WWTP	Medium
		Lennox Head WWTP	Medium

Source: CWT, 2020

CWT (2020) identified the preferred IPR scheme to be the transfer of treated effluent from Ballina WWTP to Lennox Head WWTP where the two effluent sources would be combined and further treated in an upgraded AWRP at Lennox Head before being transferred to ECD. This arrangement was considered to result in the lowest infrastructure cost for the most potable water replacement. Figure 16 shows the arrangement of the scheme.

Further investigation is required to determine the potential additional yield that could be achieved by recycling the effluent from the East Lismore and South Lismore WWTPs and the best potential site for an AWRP. CWT (2020) anticipates that the best option would be to transfer effluent from East Lismore WWTP to South Lismore WWTP where the combined effluent would undergo advanced treatment before being transferred to the WRS.

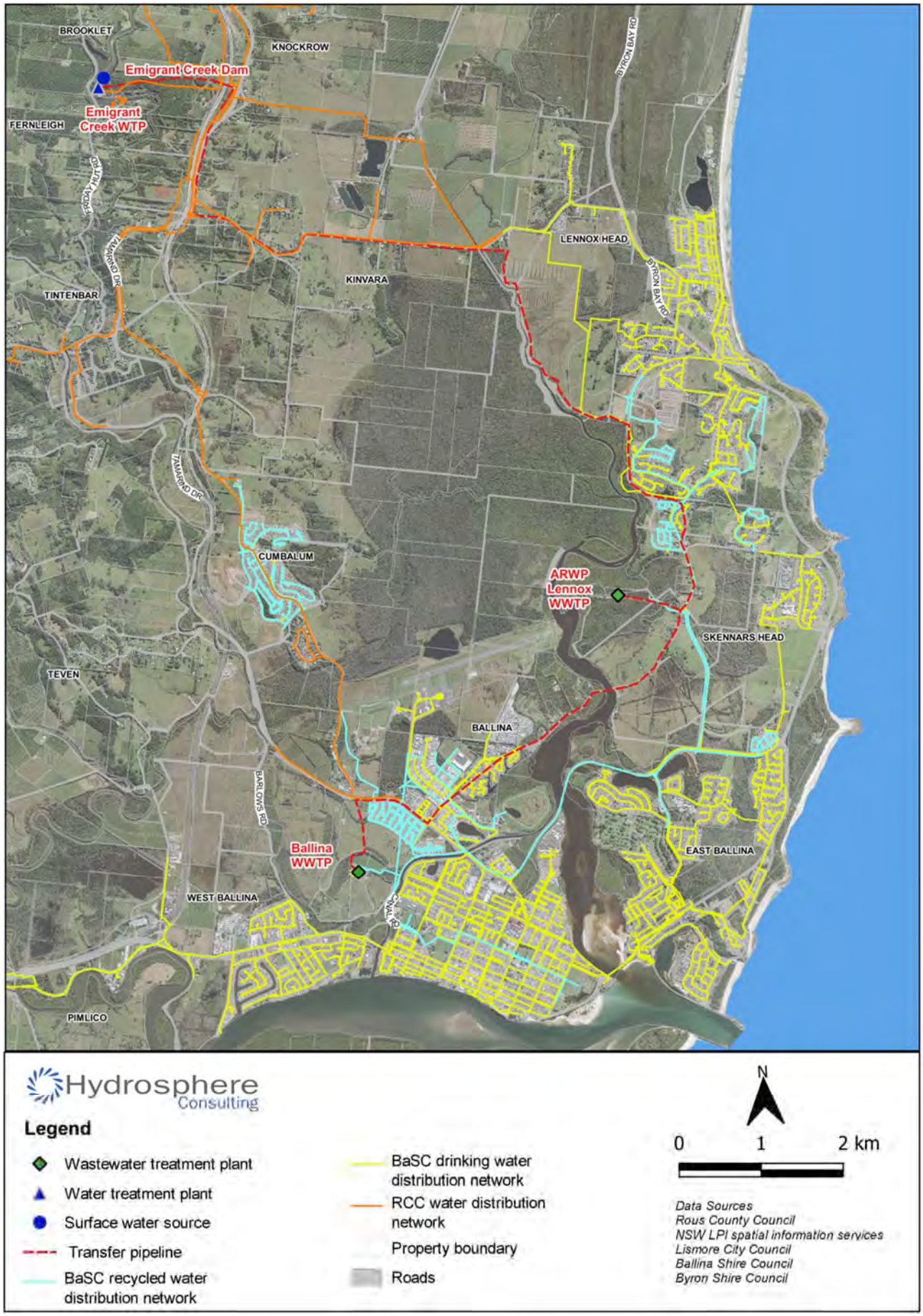

Figure 16: Ballina IPR scheme

11.2 Secure Yield

The secure yield of the IPR options has been assessed using the RCC Bulk Water Supply Security Model (Engeny, 2020) with results shown in Table 26. The 2020, 2030 and 2060 secure yield of the IPR options is shown in Figure 17, using a similar approach as for the current system (Section 5.2).

Table 26: Increase in system secure yield with IPR

Option	Historic climate (5/10/10)	Reduction factor[1]	1°C climate warming
East and South Lismore AWRP (5 ML/d to WRS)	750	0.969	727
Lennox Head AWRP (5 ML/d to ECD)	900		872
Combined schemes	1,350		1,308

Source: Engeny (2020).

1. Reduction factor was only calculated for the combined IPR schemes and has been applied to each scheme.

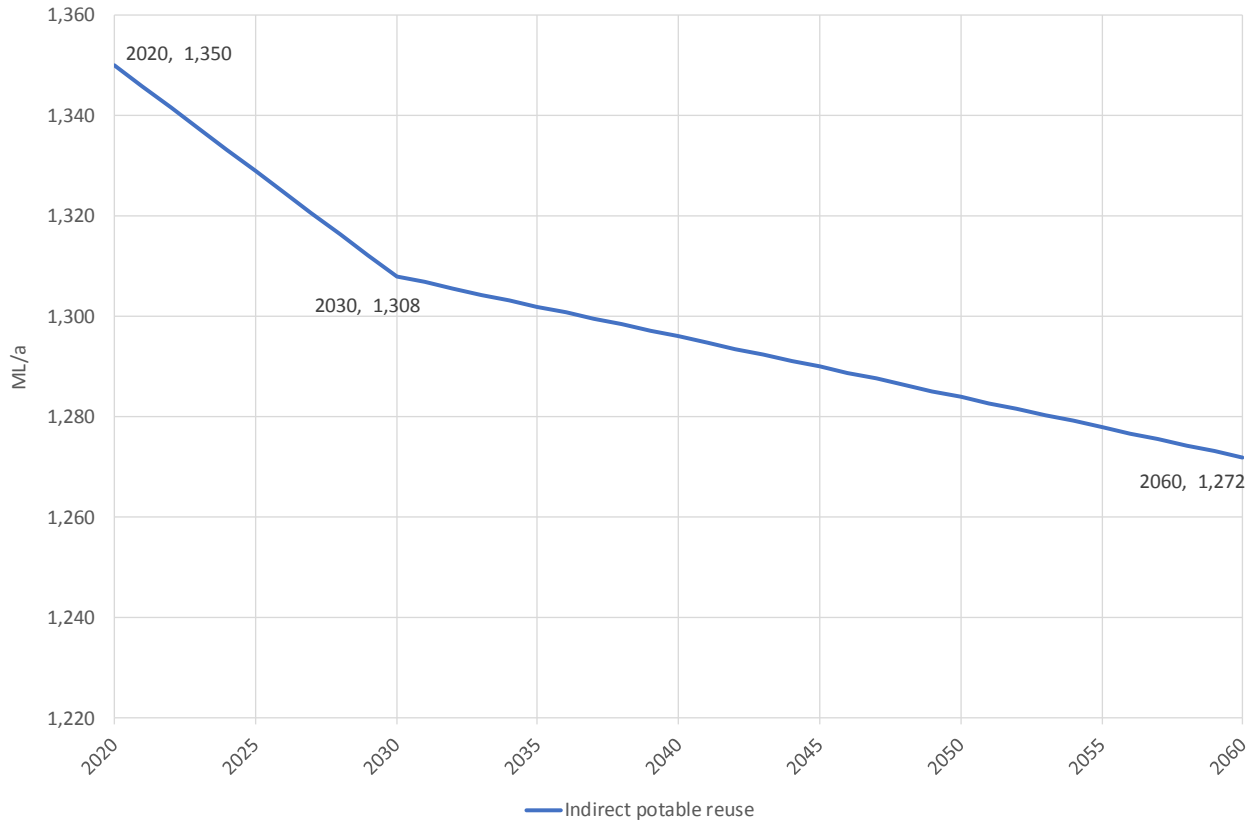

Figure 17: Secure yield estimates – IPR option

11.3 Data Gaps and Key Risks

To progress the development of the IPR options, the items outlined in Table 27 should be addressed by RCC. These would be undertaken as part of planning stages and would be completed prior to a decision to proceed with the planning and approvals for the IPR options.

Table 27: Data gaps and project risks – IPR

Item	Discussion	Action required
Concept development	• Confirmation of wastewater volumes • Treatment plant concepts • Transfer system concepts	Concept design
Cost estimates	Development of total project cost estimates. The cost of the scheme is likely to be high.	Concept design phase
Detailed design	Detailed design of all infrastructure.	Detailed design phase
Environmental investigation	Investigation of the environmental impacts including the impact on water quality.	Specialist studies
Regulator consultation	Investigation of compliance with the Public Health Act, 2010 and ADWG. One of the critical considerations for this option is the approval by NSW Health that the scheme complies with public health requirements.	RCC has commenced consultation with NSW Health.
Community engagement	Development and implementation of a community engagement strategy is required. RCC considers that community opposition to IPR on the basis of public health concerns is a significant risk.	Strategy to be developed as part of Future Water Project 2060.

12. SOURCE AUGMENTATION SCENARIOS

12.1 Scenario Development

Despite the risks and data gaps identified in this report, Option 1 (Dunoon Dam), Option 2 (Marom Creek) and Option 3 (groundwater) are considered to be feasible and will be included in the source augmentation scenarios:

- Option 1 - implementation of Dunoon Dam will have a lead time of approximately 9 years (to allow for additional investigations, approvals, construction and filling of the dam). Hence a scenario including Dunoon Dam will require an interim solution to meet demand until approximately 2029.
- Option 2 - Connection to the Marom Creek water supply has a low initial cost with minimal planning and development required. The WTP is an existing asset (requiring upgrade). However, asset ownership and future supply to Wardell will need to be resolved with BaSC. This option is considered to be worth pursuing to meet the short-term demand deficit.
- Option 3 - implementation of groundwater options will have a lead time of approximately 2.5 to 4.5 years (to allow for additional investigations, approvals and construction). Groundwater options may be implemented in stages and the following have been considered in the development of staging for a groundwater scenario:
    - Alstonville groundwater – optimises Marom Creek option and expands on an existing scheme and licences but has low yield.
    - Woodburn groundwater – expands on an existing scheme, licences and land but has low yield and high cost.
    - Tyagarah groundwater – relatively low-cost groundwater, with high yield but requires a new scheme and potential impacts on GDEs need to be managed.
    - Newrybar groundwater - relatively high cost groundwater, high yield, but requires a new scheme and potential risk with wastewater disposal need to be addressed.

RCC considers that Option 4 (desalination) and Option 5 (IPR) are not as attractive due to operational constraints and expected stakeholder opposition:

- Option 4 - desalination has a high yield, is independent of climate but has a high cost. In addition, the energy consumption is very high due to the treatment processes required (2.5 times the energy consumption of a groundwater scheme with conventional treatment, based on data provided in MWH (2014)). Impacts on the Marine Park and approval requirements have not yet been determined.

  The preferred desalination scheme would supply Byron Shire. Hence a groundwater scheme in Tyagarah and a desalination scheme in Byron cannot be included in the same scenario as local demand would be provided by only one option.

  As discussed in Section 10.3, a regional desalination facility with interconnection of the Tweed and Rous regional supplies may be considered in future. This provides additional options regarding service area, site location and capacity which may make this option more attractive.
- Option 5 - IPR schemes have a low yield benefit and a potentially high cost. There is also a significant risk that the scheme would not meet public health requirements. Hence IPR has not been considered further.

12.2 Source Augmentation Scenarios

This report compares two potential source augmentation scenarios to provide water security to 2060:

- Scenario 1 – Groundwater (with Marom Creek). Scenario 1 includes the connection of Marom Creek WTP to the Rous regional supply in the short-term with staged implementation of groundwater schemes and treatment plants until the required supply yield is achieved. The components of Scenario 1 are shown on Figure 18.
- Scenario 2 – Dunoon Dam. Scenario 2 includes the connection of Marom Creek WTP to the Rous regional supply in the short-term with construction of a new dam at Dunoon. Scenario 2A considers the 20 GL dam with potential future augmentation to 50 GL. Scenario 2B considers the 50 GL dam. Both scenarios include initial implementation of the Marom Creek and Alstonville groundwater options. The Dunoon Dam scenarios include the upgrade of Nightcap WTP in 2034 from 70 ML/d to 100 ML/d. The components of Scenario 2 are shown on Figure 19.

If further investigations find that Marom Creek is not a viable option, the Woodburn groundwater scheme could be reinstated in the short-term.

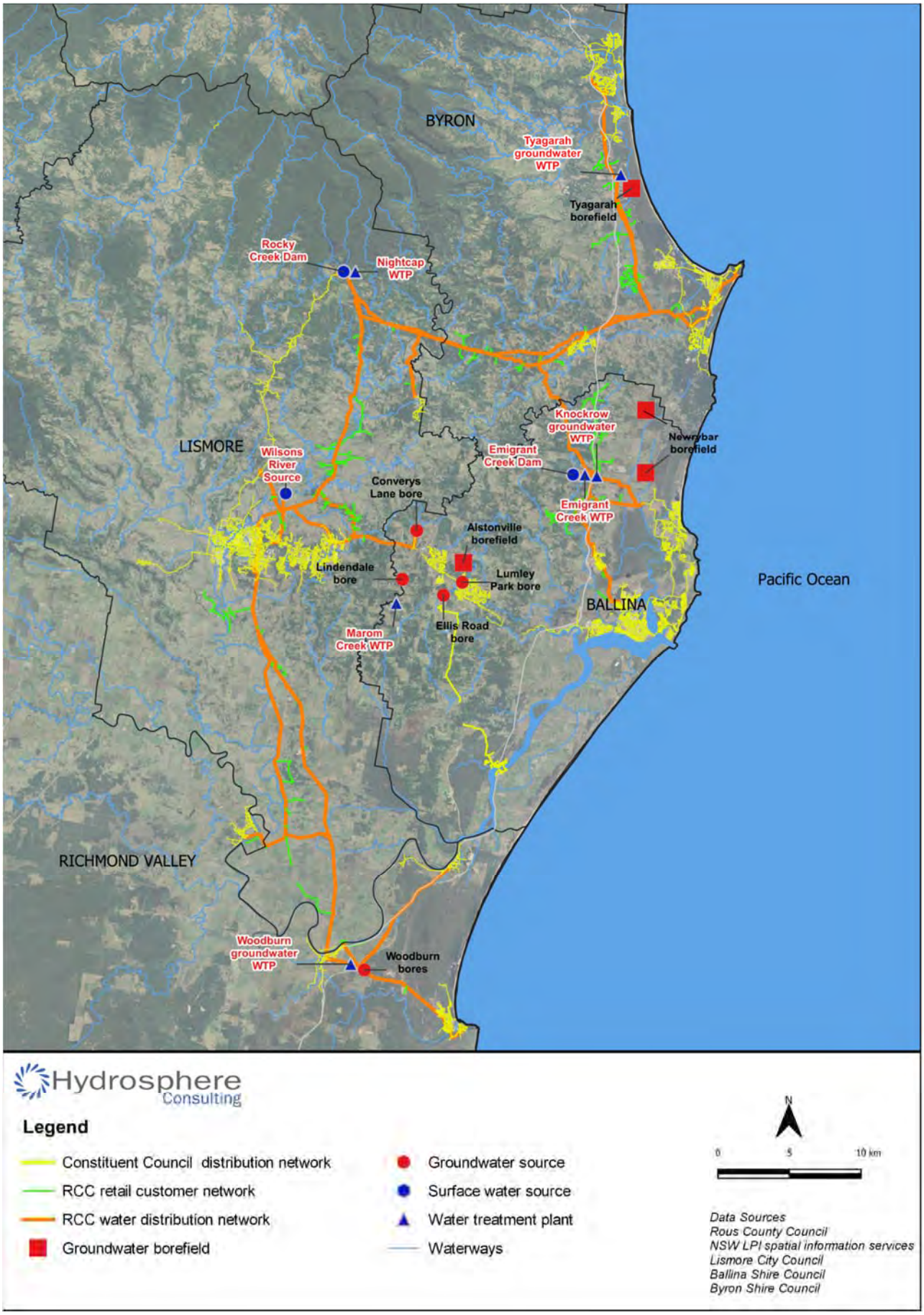

Figure 18: Scenario 1: Groundwater (with Marom Creek WTP)

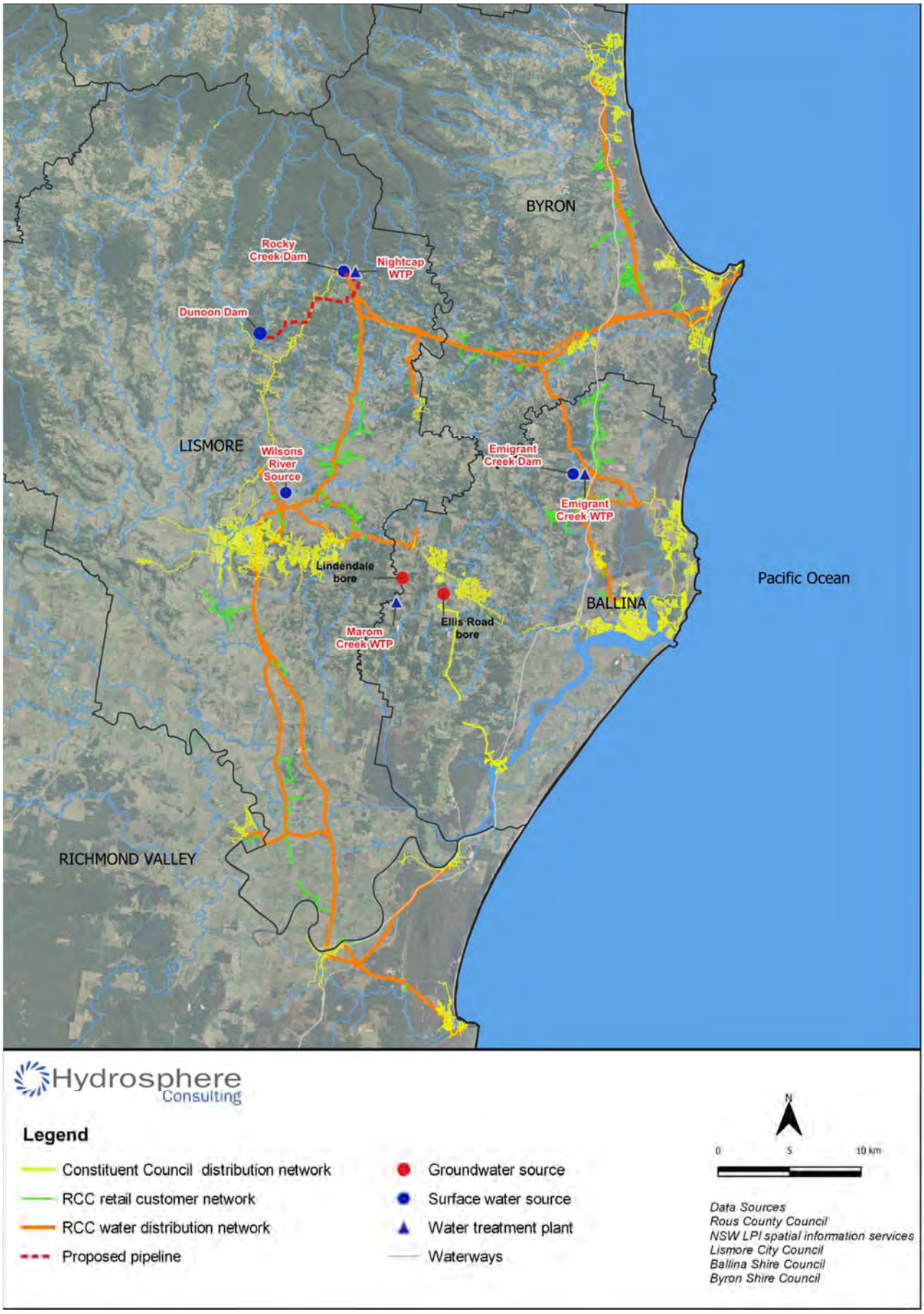

Figure 19: Scenario 2: Dunoon Dam (with Marom Creek WTP)

12.3 Secure Yield

RCC has developed these two scenarios as they are the only combinations of feasible options that passed the coarse screening and can provide the required secure yield over the long term. The staging and secure yield for each scenario are shown in the following figures compared to the dry year unrestricted demand forecast.

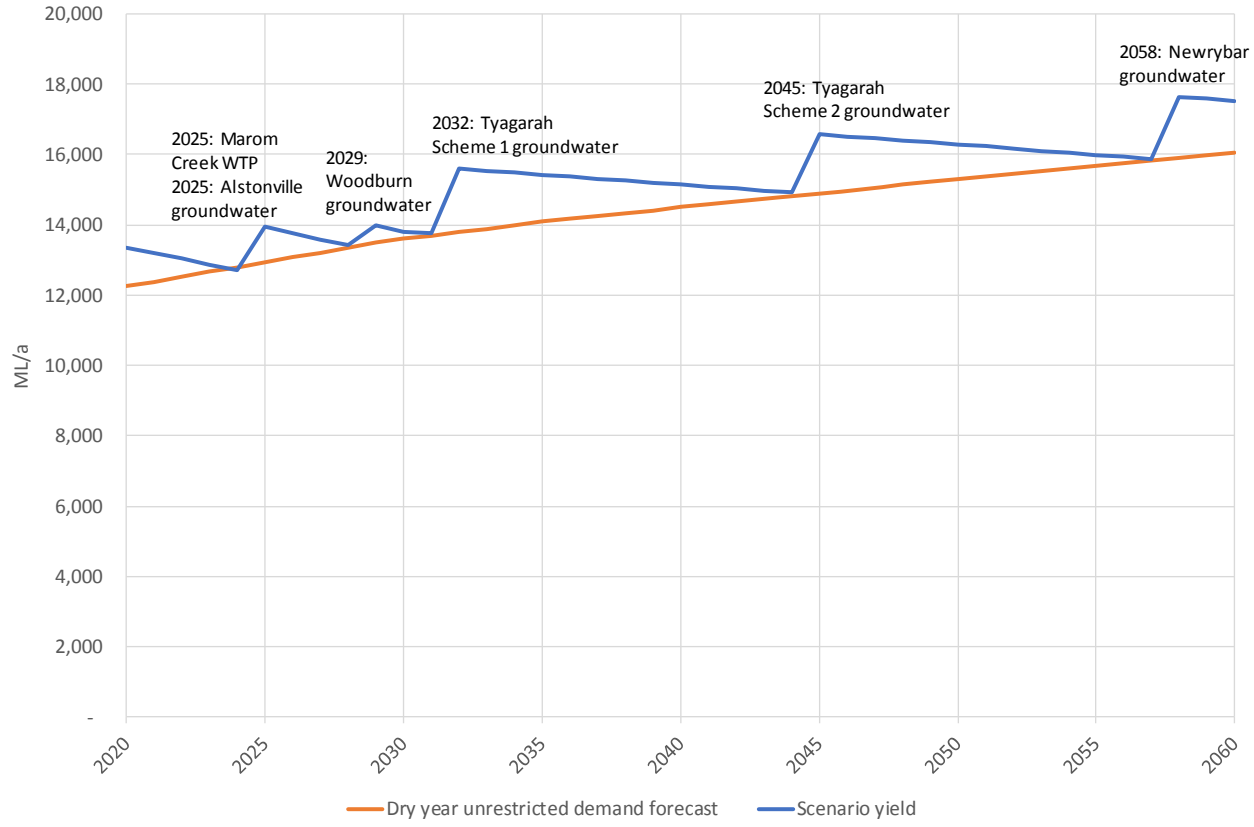

Figure 20: Secure yield and staging for scenario 1: Groundwater

The groundwater schemes identified for Scenario 1 will be able to meet demand until approximately 2072 assuming a similar rate of growth in demand is experienced beyond 2060.

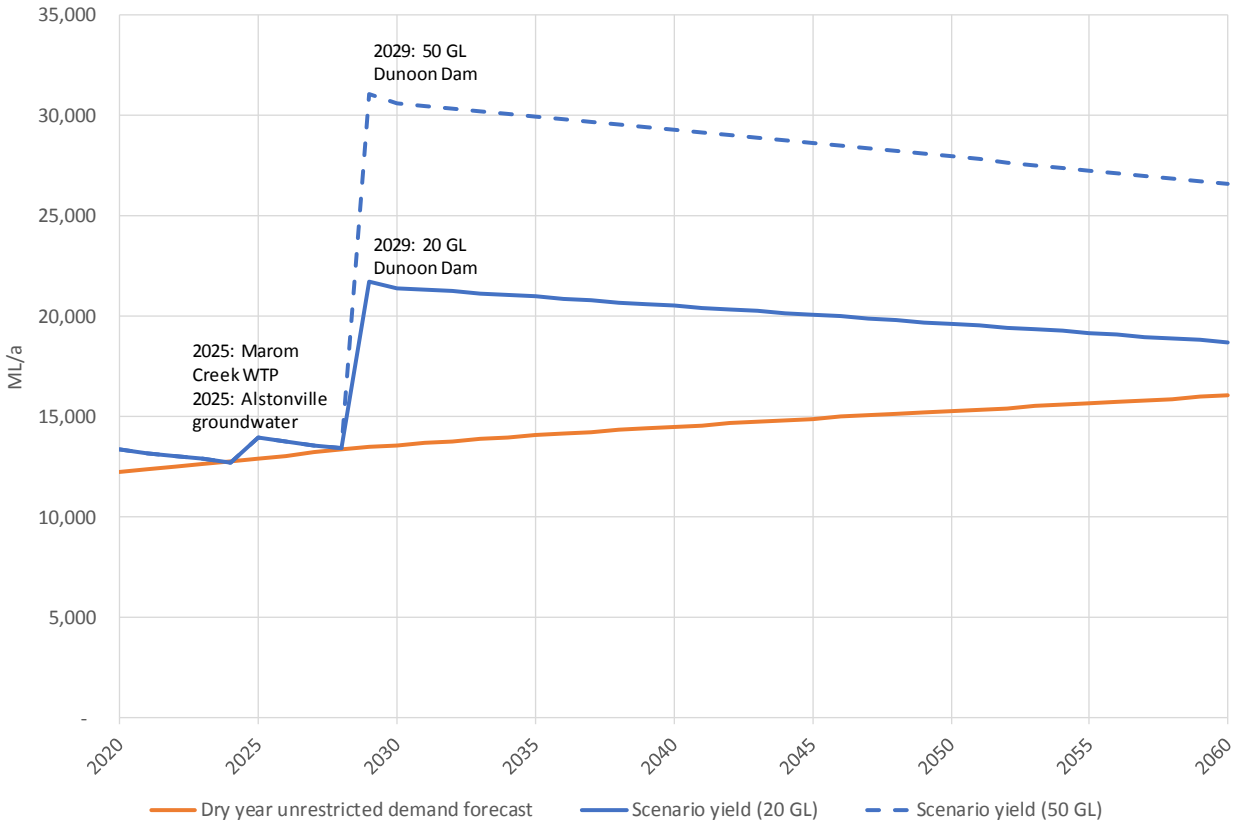

Figure 21: Secure yield and staging for scenario 2: Dunoon Dam

Scenario 2A (20 GL Dunoon Dam) would require augmentation to the 50 GL dam in approximately 2080 assuming a similar rate of growth in demand is experienced beyond 2060 and assumptions about future yield are realised. The 50 GL demand (Scenario 2B) will be able to meet demand until approximately 2115.

12.4 Multi-Criteria Analysis

12.4.1 Methodology

The multi-criteria analysis (MCA) methodology used in this project has been developed with consideration of previous studies undertaken by RCC in 2014, the coarse assessment (Section 0) and the IWCM Information Sheet 2 – *Evaluation of integrated water cycle management scenarios* (NSW Department of Industry, 2019).

The triple-bottom-line (TBL) assessment criteria are discussed in Table 28. Assessment criteria have been arranged into environmental and social groups.

Table 28: TBL assessment criteria

Criteria	Description	Information used
Environmental (ranked considering the biodiversity management hierarchy – avoid, minimise, rehabilitate, offset)		
Aquatic	Impact on groundwater and surface water quality and aquatic ecology and measures to offset those impacts.	Aquatic biodiversity impacts (e.g. high value aquatic ecosystems, threatened species, water quality, groundwater dependent ecosystems) and offsets proposed (e.g. environmental flows).

Criteria	Description	Information used
Terrestrial	Impact on terrestrial ecology and measures to offset those impacts.	Terrestrial biodiversity impacts (e.g. high value terrestrial ecosystems, threatened species) and offsets proposed (e.g. stewardship/ compensation).
Energy consumption	Operational energy consumption per kL of water produced.	Operational energy consumption (kWh/kL).
Social		
Typical residential bill	Impact on the typical residential bills for each Council from the revised notional cost.	Change in notional cost of bulk water supplied ($/ML) and predicted impact on typical residential bills.
Water users	Impact on other water users and measures to offset those impacts.	Changes to groundwater and surface water flow regime and water available for other users.
Heritage	Impact on cultural heritage and measures to offset those impacts.	Aboriginal and European heritage impacts (sites, artefacts and significance) and management measures.
Economic		
NPV	NPV of capital and operating costs (80 years) at 5% discount rate.	Capital and operating costs.

The environmental and social criteria are further discussed in the following sections.

A weighted score has been calculated for each scenario. Ranking has been calculated as follows:

(Environmental Score + Social Score)/NPV

Weightings are assigned to each criterion based on relative importance so that the sensitivity of the weightings can be tested.

12.4.2 Environmental Criteria

Terrestrial and aquatic impacts have been based on the available information as summarised in this report. Detailed studies have been undertaken for the Dunoon Dam options (Section 7) and significant impacts on terrestrial and aquatic ecology have been identified. Actions to reduce these impacts (environmental flow regime and terrestrial biodiversity offsets) and the costs of these actions have been included in the dam scenarios. RCC considers that suitable measures can be put in place to obtain planning approval and ensure stakeholder acceptance of the dam scenarios.

While limited environmental investigations have been undertaken for groundwater options, identified impacts are considered to be manageable (potential impacts on GDEs in Tyagarah area require further assessment). RCC considers that suitable measures can be put in place to obtain planning approval and ensure stakeholder acceptance of the groundwater scenarios.

The energy consumption for each option has been estimated from data used in previous reports (Table 29).

Table 29: Energy consumption rates assumed for MCA

Option	Source	Energy Consumption (kWh/kL)	Production rate
Dunoon Dam	MWH (2014)	1.6	Annual production rate has been identified by RCC to supplement RCD extraction.
Marom Creek	CWT (2018)	0.91	1,570 ML/a
Groundwater – Alstonville	MWH (2014)	0.52	1,280 ML/a
Groundwater – Woodburn	MWH (2014)	0.30	1,600 ML/a
Groundwater – Tyagarah	MWH (2014)	0.70	4,000 ML/a (ultimate)
Groundwater – Newrybar	MWH (2014)	0.40	2,304 ML/a
Conventional groundwater WTP	CWT (2018)	0.91	As for Woodburn and Tyagarah
Conventional groundwater WTP with RO	Estimate	1.82	As for Newrybar

12.4.3 Social Criteria

The impact on customer bills has been assessed using the estimated increase in the notional cost of bulk water (the charge applied to bulk water sales to the constituent councils) at 2060 as a result of funding requirements for the scenarios as estimated by RCC using its financial planning model. The impact of the increase in the cost of water on the typical residential bill charged by the constituent councils at 2060 has been estimated based on the current costs for purchase of water and total expenses for each council. This assumes that the portion of bulk sales to each council remains the same. Other changes to council expenses have also not been considered.

Water sharing plans under the *Water Management Act, 2000* govern the sharing of water in a water source between water users and the environment and rules for the trading of water in the water source. Water access licences (WALs) entitle licence holders to specified shares in the available water within a particular water management area or water source (the share component) and to take water at specified times, rates or circumstances from specified areas or locations (the extraction component). WALs may be granted to access the available water governed by a water sharing plan under the Act.

Rocky Creek is subject to the *Water Sharing Plan for the Richmond River Area Unregulated, Regulated and Alluvial Water Sources 2010*. Use of water captured by Dunoon Dam would be subject to a WAL and may require a new or amended licence. The environmental flow regime proposed for the Dunoon Dam options is a key consideration for the water use and works approvals. RCC considers that suitable measures can be put in place to obtain approval and ensure stakeholder acceptance of the dam scenarios.

Similarly, for groundwater use, water sharing plan provisions are in place for environmental water allocations, basic landholder rights, domestic and stock rights and native title rights. RCC considers that suitable measures can be put in place to obtain approval and ensure stakeholder acceptance of the groundwater scenarios.

Cultural heritage impact assessments undertaken for Dunoon Dam have identified significant Aboriginal cultural heritage values and sites. This remains a key risk to be addressed for this scenario.

Preliminary assessment of cultural heritage impacts undertaken for the groundwater options have not identified any impacts that cannot be managed.

12.4.4 Cost Estimates and Expenditure Profile

Whole of life and NPV cost estimates for the water supply scenarios are shown in the following table. NPV calculations are included in Appendix 1.

Table 30: Scenario cost estimates

Component	Scenario 1: Groundwater (2020 $)	Scenario 2A: 20 GL Dunoon Dam (2020 $)	Scenario 2B: 50 GL Dunoon Dam (2020 $)
Whole-of-life (80 years)	$836,397,007	$619,141,183	$658,907,966
NPV (80 years @ 5%)	$195,922,792	$242,778,718	$267,518,613
NPV (40 years @ 5%)	$169,299,256	$228,151,363	$252,602,785
Yield benefit (2020 – 2060) ML/a	4,170	5,370	13,249
NPV/ML secure yield (40 years)	$40,597	$42,484	$19,066

The expenditure profile of each scenario and a comparison of the scenarios is shown in the following figures.

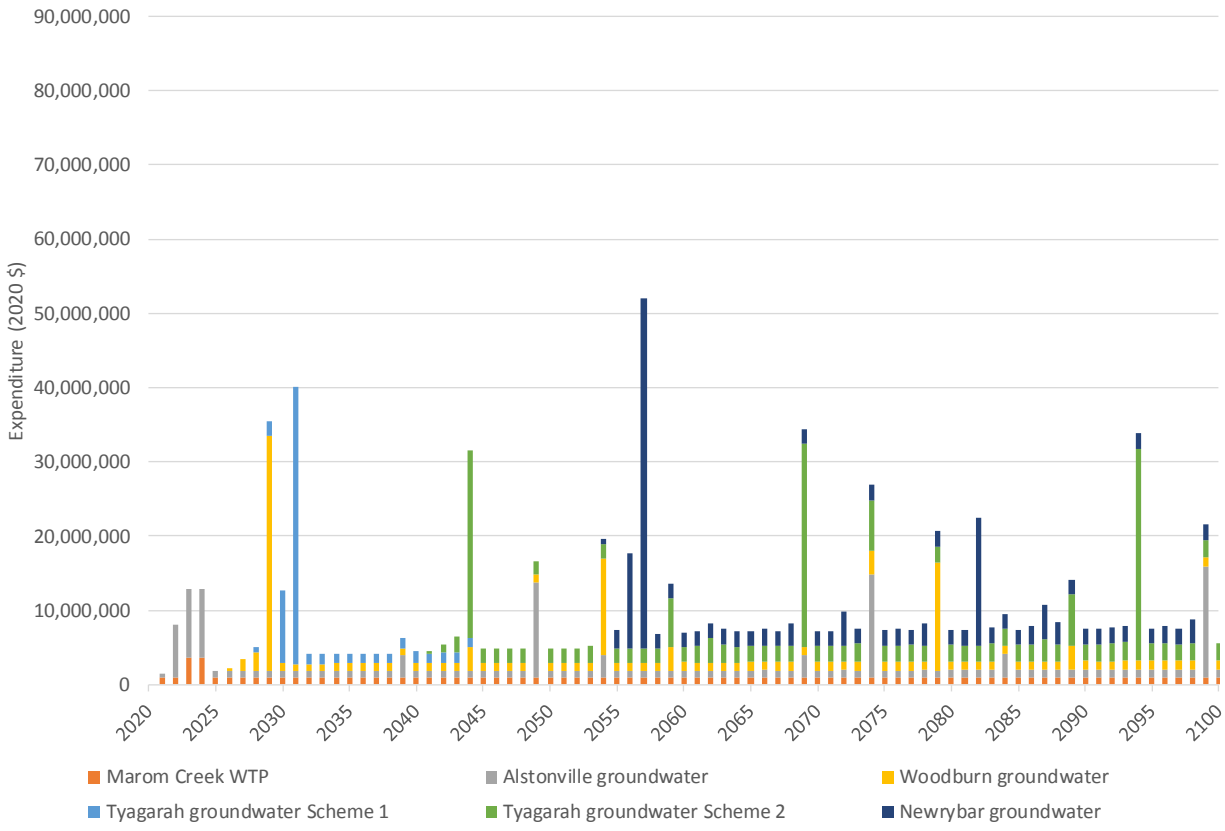

Figure 22: Expenditure profile – Scenario 1: groundwater

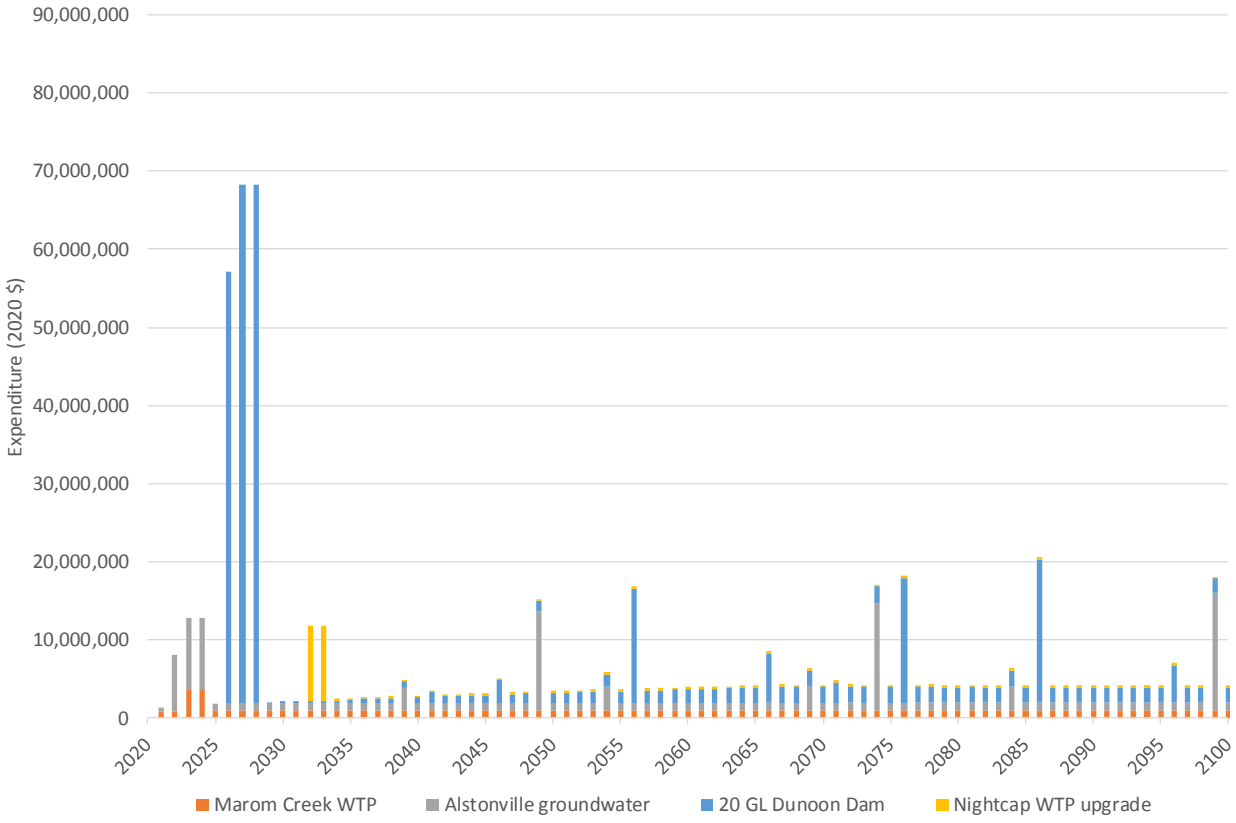

Figure 23: Expenditure profile – Scenario 2A: Dunoon Dam (20 GL)

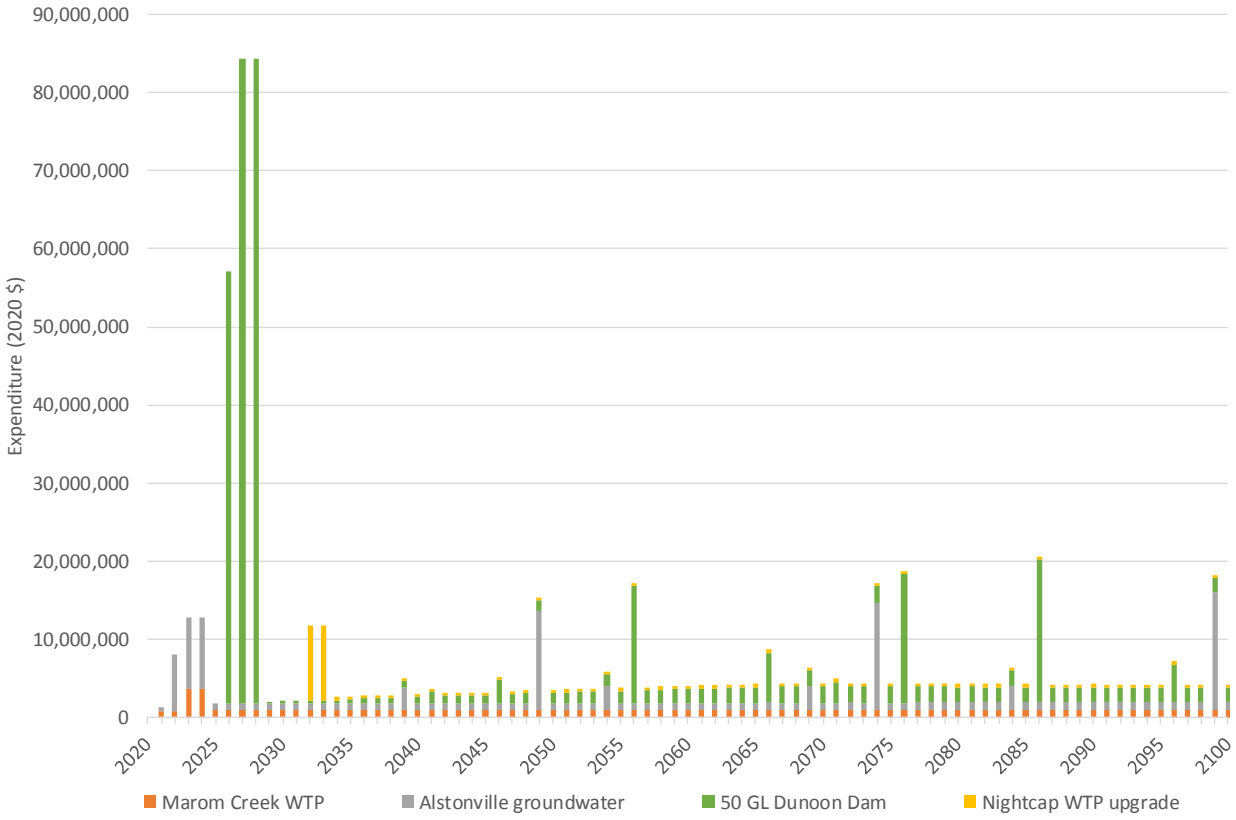

Figure 24: Expenditure profile – Scenario 2B: Dunoon Dam (50 GL)

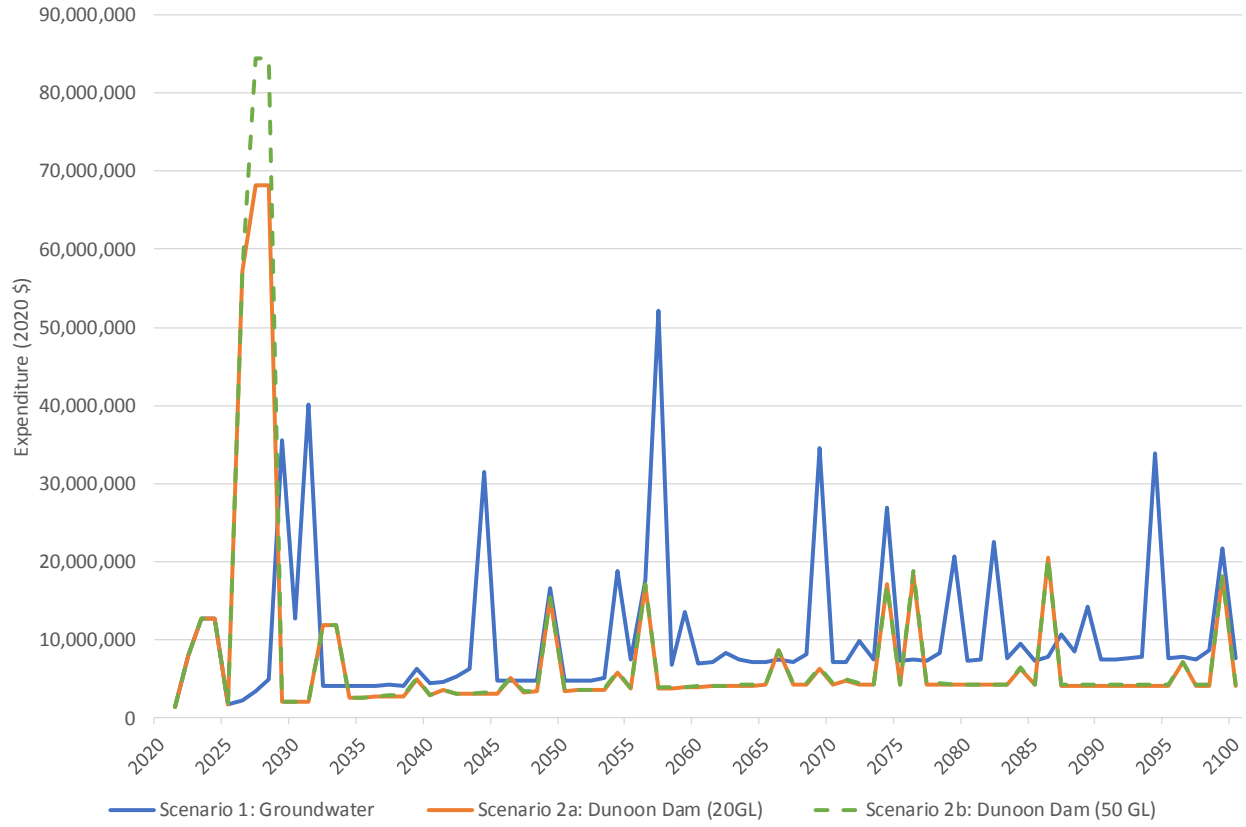

Figure 25: Expenditure profile – scenario comparison

12.4.5 Results

The full MCA is included in Appendix 2. A summary of MCA outcomes (with equal weighting for each criteria) is provided in the following table. Changing the weightings does not change the outcomes of the MCA ranking.

Table 31: Summary of MCA outcomes

Scenario	Environmental score (/5)	Social score (/5)	Total score (per $ NPV)	Rank (based on MCA)
1: Groundwater	3.05	3.50	16.2	1
2A: Dunoon Dam (20 GL)	2.65	1.98	9.9	2
2B: Dunoon Dam (50 GL)	2.30	1.65	7.8	3

Based on the MCA, the most favourable scenario is groundwater. The groundwater scenario has a lower NPV (lower initial capital cost but higher and increasing recurrent costs with implementation of each stage) as well as less significant environmental and social impacts. However, the groundwater scenario has a higher whole-of life cost (total cost over 80 years in present dollars) and a higher NPV per ML of secure yield as shown in Table 30. Implementation of the groundwater scenario will require ongoing investigations (and associated costs and problem-solving) for the four groundwater schemes.

Although the MCA is informative, it is focussed on the 2060 planning horizon and RCC should consider longer-term issues such as potential source options beyond that timeframe and financial commitment and funding requirements imposed by the schemes. Dams have a long design life and there is excess secure yield in the Dunoon Dam options well beyond the 2060 timeframe considered by this study. When the long-term yield benefit provided by the scenarios is considered, the 50 GL dam option (with high initial cost and

lower recurrent costs) with the higher yield benefit is more cost-effective. Although there is a large upfront investment, the dam options can provide long-term certainty and cost efficiencies. The largest dam for the given physical constraints, with planned staging and upgrades, provides only a small incremental risk over the smaller dam. There is a trade-off between the high initial cost and environmental/social impact of the dam and the long-term cost-effectiveness and certainty provided.

Implementation risks have been identified in this report for both scenarios. RCC should continue to conduct detailed investigations for its preferred scenario and address these risks. Although the yield information suggests that definitive action is required in the short-term, adaptive management approaches should also be identified.

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GLOSSARY AND ABBREVIATIONS

ADD	Average day demand
AHD	Australian height datum
ASS	Acid sulfate soil
BASIX	Building Sustainability Index
BaSC	Ballina Shire Council
BySC	Byron Shire Council
DPIE	(NSW) Department of Planning, Infrastructure and Environment
ECD	Emigrant Creek Dam
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EPBC	*Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act)
FSL	Full supply level
FWS	Future Water Strategy
GDE	Groundwater dependent ecosystem
GL	Gigalitres (one million litres)
IWP	Integrated Water Planning (process)
kL	Kilolitres
kL/a	Kilolitres per annum
L	Litres
L/d	Litres per day
LCC	Lismore City Council
LEP	Local Environmental Plan
MCA	Multi-criteria analysis
MFL	Maximum flood level
ML	Megalitres
ML/a	Megalitres (one thousand litres) per annum
ML/d	Megalitres per day
NOROC	(former) Northern Rivers Regional Organisation of Councils
NPV	Net present value - the present value of a series of future payments
OEH	Office of Environment and Heritage
PADs	Potential archaeological deposits
PDD	Peak day demand
RCC	Rous County Council

RCD	Rocky Creek Dam
RDMP	Regional Demand Management Plan
RL	Reduced level (relative to Australian height datum)
RO	Reverse osmosis
RoTAP	Rare or Threatened Australian Plants
RVC	Richmond Valley Council
Secure yield	The highest annual water demand that can be supplied from a water supply headworks system while meeting the '5/10/10 design rule'
SEPP	State Environmental Planning Policy
SEQ	South-east Queensland
TSC	Tweed Shire Council
WRS	Wilsons River Source
WTP	Water treatment plant
WWTP	Wastewater treatment plant

Appendix 1. NET PRESENT VALUE CALCULATIONS

Life cycle cost analysis - 50 GL Dunoon Dam

Estimated costs (2020 $)			Source	Total 80 years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Initial acquisition costs (non-recurring)																																										
Capital costs																																										
	Construction costs (asset renewal life)			$ -																																						
	RCC Dam (incl. destratifier)		PWA	$ 112,275,735		56,137,868	56,137,868																																			
	Pumping station		PWA	$ 16,091,790		8,045,895	8,045,895																																			
	Rising main		PWA	$ 18,901,740		9,450,870	9,450,870																																			
	Roads		PWA	$ 17,345,900		8,672,950	8,672,950																																			
	34% Indirect costs		RCC (includes pre-construction etc)	$ 55,384,835	55,384,835																																					
	Total initial capital costs			$ 220,000,000	$ 55,384,835	$ 82,307,583	$ 82,307,583	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Renewals	RCC Dam (incl. destratifier)	PWA	$ 9,906,000																221,000														2,369,900									
		Pumping station	PWA	$ 25,875,200																343,200					832,000									8,552,700									
		Rising main	PWA	$ 10,093,200																																							
		Roads	PWA	$ 8,405,800																					821,600									2,463,500									
	Total renewal costs			$ 54,280,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 564,200	$ -	$ -	$ -	$ -	$ -	$ 1,653,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,386,100	$ -	$ -	$ -	$ -	$ -
Total acquisition costs				$ 274,280,200	$ 55,384,835	$ 82,307,583	$ 82,307,583	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 564,200	$ -	$ -	$ -	$ -	$ 1,653,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 13,386,100	$ -	$ -	$ -	$ -	$ -
Ongoing operating and maintenance (recurring)																																										
	Maintenance costs																																									
	RCC Dam (incl. destratifier)		PWA	$ 3,062,207	-	18,069	18,069	18,069	18,069	18,069	18,069	18,069	18,069	18,069	18,069	36,138	36,138	36,138	36,138	35,348	35,743	35,743	35,743	35,743	35,743	41,558	41,558	41,558	41,558	41,558	41,953	41,953	41,953	41,953	27,368	45,437	45,437	45,437	45,437	45,437	45,437	45,437	45,437
	Pumping station		PWA	$ 5,075,287	-	35,333	35,333	35,333	35,333	35,333	35,333	35,333	35,333	35,333	35,333	70,666	70,666	70,666	70,666	68,218	69,442	69,442	69,442	69,442	69,442	68,162	98,702	98,702	98,702	98,702	99,926	99,926	99,926	99,926	14,753	50,086	50,086	50,086	50,086	50,086	50,086	50,086	50,086
	Rising main		PWA	$ 1,918,620	-	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620
	Roads		PWA	$ 1,960,402	-	11,255	11,255	11,255	11,255	11,255	11,255	11,255	11,255	11,255	11,255	22,510	22,510	22,510	22,510	22,510	22,510	22,510	22,510	22,510	21,246	21,878	21,878	21,878	21,878	21,878	21,878	21,878	21,878	21,878	18,088	29,343	29,343	29,343	29,343	29,343	29,343	29,343	29,343
	Total maintenance costs			$ 12,190,755	$ -	$ 77,197	$ 77,197	$ 77,197	$ 77,197	$ 77,197	$ 77,197	$ 77,197	$ 77,197	$ 77,197	$ 77,197	$ 154,394	$ 154,394	$ 154,394	$ 154,394	$ 151,156	$ 152,775	$ 152,775	$ 152,775	$ 152,775	$ 150,231	$ 187,218	$ 187,218	$ 187,218	$ 187,218	$ 187,218	$ 188,837	$ 188,837	$ 188,837	$ 188,837	$ 85,289	$ 162,486	$ 162,486	$ 162,486	$ 162,486	$ 162,486	$ 162,486	$ 162,486	$ 162,486
	Operating costs																																										
	DAM			$ -																																						
	Annual Operation/ Inspection		PWA	$ 4,680,000		60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
	Destratifier operation		PWA	$ 8,580,000		110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
	5-yearly Dam movement surve		PWA	$ 600,000						40,000					40,000					40,000					40,000					40,000					40,000					40,000				
	20-yearly Dam safety review		PWA	$ 600,000																					40,000																				
	PUMPING STATION			$ -																																								
	Water pumping cost		PWA	$ 94,403,891		45,977	45,977	45,977	45,977	45,977	95,226	144,474	193,720	242,965	292,209	341,452	390,694	439,934	489,174	538,412	587,649	636,886	686,121	735,355	784,587	833,819	883,050	932,279	981,508	1,030,735	1,079,962	1,129,187	1,178,411	1,227,634	1,276,857	1,326,078	1,375,298	1,424,517	1,473,735	1,522,952	1,572,168	1,621,383	1,670,597	1,719,810
	Total operating costs			$ 110,515,416	$ -	$ 215,977	$ 215,977	$ 215,977	$ 215,977	$ 255,977	$ 265,226	$ 314,474	$ 363,720	$ 412,965	$ 502,209	$ 511,452	$ 560,694	$ 609,934	$ 659,174	$ 748,412	$ 757,649	$ 806,886	$ 856,121	$ 905,355	$ 1,194,587	$ 1,003,819	$ 1,053,050	$ 1,102,279	$ 1,151,508	$ 1,240,735	$ 1,249,962	$ 1,299,187	$ 1,348,411	$ 1,397,634	$ 1,486,857	$ 1,496,078	$ 1,545,298	$ 1,594,517	$ 1,643,735	$ 1,732,952	$ 1,742,168	$ 1,791,383	$ 1,840,597	$ 1,889,810
Total operating and maintenance costs				$ 122,706,171	$ -	$ 293,174	$ 293,174	$ 293,174	$ 293,174	$ 333,174	$ 342,423	$ 391,671	$ 440,917	$ 490,162	$ 579,406	$ 665,846	$ 715,088	$ 764,328	$ 813,568	$ 899,568	$ 910,424	$ 959,661	$ 1,008,896	$ 1,058,130	$ 1,344,818	$ 1,191,037	$ 1,240,268	$ 1,289,497	$ 1,338,726	$ 1,427,953	$ 1,438,799	$ 1,488,024	$ 1,537,248	$ 1,586,471	$ 1,572,146	$ 1,658,564	$ 1,707,784	$ 1,757,003	$ 1,806,221	$ 1,895,438	$ 1,904,654	$ 1,953,869	$ 2,003,083	$ 2,052,296
Total Costs				$ 396,986,371	$ 55,384,835	$ 82,600,757	$ 82,600,757	$ 293,174	$ 293,174	$ 333,174	$ 342,423	$ 391,671	$ 440,917	$ 490,162	$ 579,406	$ 665,846	$ 715,088	$ 764,328	$ 813,568	$ 1,463,768	$ 910,424	$ 959,661	$ 1,008,896	$ 1,058,130	$ 2,998,418	$ 1,191,037	$ 1,240,268	$ 1,289,497	$ 1,338,726	$ 1,427,953	$ 1,438,799	$ 1,488,024	$ 1,537,248	$ 1,586,471	$ 14,958,246	$ 1,658,564	$ 1,707,784	$ 1,757,003	$ 1,806,221	$ 1,895,438	$ 1,904,654	$ 1,953,869	$ 2,003,083	$ 2,052,296

80 year whole-of-life cost	$	396,986,371																																									
80 year NPV	$	263,580,730	3%																																									
	$	234,596,513	5%																																									
	$	219,388,230	7%																																									

Estimated costs (2020 $)			Source	Total 80 years	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Initial acquisition costs (non-recurring)																																											
Capital costs																																											
	Construction costs (asset renewal life)			$ -																																							
	RCC Dam (incl. destratifier)		PWA	$ 112,275,735																																								
	Pumping station		PWA	$ 16,091,790																																								
	Rising main		PWA	$ 18,901,740																																								
	Roads		PWA	$ 17,345,900																																								
	34% Indirect costs		RCC (includes pre-construction etc)	$ 55,384,835																																								
	Total initial capital costs			$ 220,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Renewals	RCC Dam (incl. destratifier)	PWA	$ 9,906,000						221,000					3,398,200										3,474,900														221,000				
		Pumping station	PWA	$ 25,875,200	2,216,500					343,200					988,000										9,384,700									2,871,700					343,200				
		Rising main	PWA	$ 10,093,200											10,093,200																												
		Roads	PWA	$ 8,405,800	1,835,600																				3,285,100																			
	Total renewal costs			$ 54,280,200	$ 4,052,100	$ -	$ -	$ -	$ -	$ 564,200	$ -	$ -	$ -	$ -	$ 14,479,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,144,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,871,700	$ -	$ -	$ -	$ -	$ 564,200	$ -	$ -	$ -	$ -
Total acquisition costs				$ 274,280,200	$ 4,052,100	$ -	$ -	$ -	$ -	$ 564,200	$ -	$ -	$ -	$ -	$ 14,479,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,144,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,871,700	$ -	$ -	$ -	$ -	$ 564,200	$ -	$ -	$ -	$ -
Ongoing operating and maintenance (recurring)																																										
	Maintenance costs																																										
	RCC Dam (incl. destratifier)		PWA	$ 3,062,207	45,437	50,697	50,697	50,697	50,697	49,907	50,302	50,302	50,302	50,302	36,510	44,589	44,589	44,589	44,589	44,589	44,984	44,984	44,984	44,984	27,849	37,973	37,973	37,973	37,973	37,973	37,973	37,973	37,973	37,973	37,973	45,833	45,833	45,833	45,833	45,043	45,438	45,438	45,438
	Pumping station		PWA	$ 5,075,287	37,706	70,070	70,070	70,070	70,070	70,070	67,622	68,846	68,846	68,846	66,566	98,466	98,466	98,466	98,466	98,466	98,466	99,690	99,690	99,690	13,237	45,761	45,761	45,761	45,761	45,761	45,761	45,761	45,761	45,761	39,134	73,707	73,707	73,707	73,707	71,259	72,483	72,483	72,483
	Rising main		PWA	$ 1,918,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	-	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080
	Roads		PWA	$ 1,960,402	25,739	29,046	29,046	29,046	29,046	29,046	29,046	29,046	29,046	29,046	30,458	30,458	30,458	30,458	30,458	30,458	30,458	30,458	30,458	30,458	25,404	27,931	27,931	27,931	27,931	27,931	27,931	27,931	27,931	27,931	31,238	31,238	31,238	31,238	31,238	31,238	31,238	31,238	31,238
	Total maintenance costs			$ 12,190,755	$ 146,502	$ 187,433	$ 187,433	$ 187,433	$ 187,433	$ 186,643	$ 184,590	$ 185,814	$ 185,814	$ 185,814	$ 132,122	$ 186,053	$ 186,053	$ 186,053	$ 186,053	$ 186,053	$ 186,448	$ 187,672	$ 187,672	$ 187,672	$ 79,030	$ 136,745	$ 136,745	$ 136,745	$ 136,745	$ 136,745	$ 136,745	$ 136,745	$ 136,745	$ 136,745	$ 130,118	$ 175,858	$ 175,858	$ 175,858	$ 175,858	$ 172,620	$ 174,239	$ 174,239	$ 174,239	$ 174,238
	Operating costs																																										
	DAM			$ -																																							
	Annual Operation/ Inspection		PWA	$ 4,680,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
	Destratifier operation		PWA	$ 8,580,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
	5-yearly Dam movement surve		PWA	$ 600,000	40,000					40,000					40,000					40,000					40,000					40,000					40,000					40,000				
	20-yearly Dam safety review		PWA	$ 600,000	200,000																				200,000																			
	PUMPING STATION			$ -																																								
	Water pumping cost		PWA	$ 94,403,891	1,766,444	1,758,495	1,750,581	1,742,704	1,734,862	1,727,055	1,719,283	1,711,546	1,703,844	1,696,177	1,688,544	1,680,946	1,673,381	1,665,851	1,658,355	1,650,892	1,643,463	1,636,068	1,628,705	1,621,376	1,614,080	1,606,817	1,599,586	1,592,388	1,585,222	1,578,089	1,570,987	1,563,918	1,556,880	1,549,874	1,542,900	1,535,957	1,529,045	1,522,164	1,515,314	1,508,496	1,501,707	1,494,950	1,488,222	1,481,525
	Total operating costs			$ 110,515,416	$ 2,176,444	$ 1,928,495	$ 1,920,581	$ 1,912,704	$ 1,904,862	$ 1,937,055	$ 1,889,283	$ 1,881,546	$ 1,873,844	$ 1,866,177	$ 1,898,544	$ 1,850,946	$ 1,843,381	$ 1,835,851	$ 1,828,355	$ 1,860,892	$ 1,813,463	$ 1,806,068	$ 1,798,705	$ 1,791,376	$ 2,024,080	$ 1,776,817	$ 1,769,586	$ 1,762,388	$ 1,755,222	$ 1,788,089	$ 1,740,987	$ 1,733,918	$ 1,726,880	$ 1,719,874	$ 1,752,900	$ 1,705,957	$ 1,699,045	$ 1,692,164	$ 1,685,314	$ 1,718,496	$ 1,671,707	$ 1,664,950	$ 1,658,222	$ 1,651,525
Total operating and maintenance costs				$ 122,706,171	$ 2,322,946	$ 2,115,928	$ 2,108,014	$ 2,100,137	$ 2,092,295	$ 2,123,698	$ 2,073,873	$ 2,067,360	$ 2,059,658	$ 2,051,991	$ 2,030,666	$ 2,036,999	$ 2,029,434	$ 2,021,904	$ 2,014,408	$ 2,046,945	$ 1,999,911	$ 1,993,740	$ 1,986,377	$ 1,979,048	$ 2,103,110	$ 1,913,562	$ 1,906,331	$ 1,899,133	$ 1,891,967	$ 1,924,834	$ 1,877,732	$ 1,870,663	$ 1,863,625	$ 1,856,619	$ 1,883,018	$ 1,881,815	$ 1,874,903	$ 1,868,022	$ 1,861,172	$ 1,891,116	$ 1,845,946	$ 1,839,189	$ 1,832,461	$ 1,825,764
Total Costs				$ 396,986,371	$ 6,375,046	$ 2,115,928	$ 2,108,014	$ 2,100,137	$ 2,092,295	$ 2,687,898	$ 2,073,873	$ 2,067,360	$ 2,059,658	$ 2,051,991	$ 16,510,066	$ 2,036,999	$ 2,029,434	$ 2,021,904	$ 2,014,408	$ 2,046,945	$ 1,999,911	$ 1,993,740	$ 1,986,377	$ 1,979,048	$ 18,247,810	$ 1,913,562	$ 1,906,331	$ 1,899,133	$ 1,891,967	$ 1,924,834	$ 1,877,732	$ 1,870,663	$ 1,863,625	$ 1,856,619	$ 4,754,718	$ 1,881,815	$ 1,874,903	$ 1,868,022	$ 1,861,172	$ 2,455,316	$ 1,845,946	$ 1,839,189	$ 1,832,461	$ 1,825,764

80 year whole-of-life cost	$	396,986,371																																									
80 year NPV	$	263,580,730	3%																																									
	$	234,596,513	5%																																									
	$	219,388,230	7%																																									

Life cycle cost analysis - 20 GL Dunoon Dam

Estimated costs (2020 $)	Source	Total 80 years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Initial acquistion costs (non-recurring)																						
Capital costs																						
Construction costs (asset renewal life)		$ -																				
RCC Dam (incl. destratifier)	PWA	$ 80,473,250		40,236,625	40,236,625																	
Pumping station	PWA	$ 16,091,790		8,045,895	8,045,895																	
Rising main	PWA	$ 18,901,740		9,450,870	9,450,870																	
Roads	PWA	$ 17,345,900		8,672,950	8,672,950																	
assume same as 50 GL — Indirect costs	RCC (includes pre-construction etc)	$ 55,384,835	55,384,835																			
Total initial capital costs		**$ 188,197,515**	**$ 55,384,835**	**$ 66,406,340**	**$ 66,406,340**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals — RCC Dam (incl. destratifier)	PWA	$ 9,285,900																221,000				
Pumping station	PWA	$ 25,875,200																343,200				
Rising main	PWA	$ 10,093,200																				
Roads	PWA	$ 8,405,800																				
Total renewal costs		**$ 53,660,100**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 564,200**	$ -	$ -	$ -	$ -
Total acquisition costs		**$ 241,857,615**	**$ 55,384,835**	**$ 66,406,340**	**$ 66,406,340**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 564,200**	$ -	$ -	$ -	$ -
Ongoing operating and maintenance (recurring)																						
Maintenance costs																						
RCC Dam (incl. destratifier)	PWA	$ 2,744,234	-			16,343	16,343	16,343	16,343	16,343	16,343	16,343	16,343	32,686	32,686	32,686	32,686	31,896	32,291	32,291	32,291	32,291
Pumping station	PWA	$ 5,004,621	-			35,333	35,333	35,333	35,333	35,333	35,333	35,333	35,333	70,666	70,666	70,666	70,666	68,218	69,442	69,442	69,442	69,442
Rising main	PWA	$ 1,893,540	-			12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080
Roads	PWA	$ 1,937,892	-			11,255	11,255	11,255	11,255	11,255	11,255	11,255	11,255	22,510	22,510	22,510	22,510	22,510	22,510	22,510	22,510	22,510
Total maintenance costs		**$ 11,750,275**	$ -	$ -	$ -	**$ 75,471**	**$ 75,471**	**$ 75,471**	**$ 75,471**	**$ 75,471**	**$ 75,471**	**$ 75,471**	**$ 75,471**	**$ 150,942**	**$ 150,942**	**$ 150,942**	**$ 150,942**	**$ 147,704**	**$ 149,323**	**$ 149,323**	**$ 149,323**	**$ 149,323**
Operating costs																						
DAM		$ -																				
Annual Operation/ Inspection	PWA	$ 4,560,000				60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Destratifier operation	PWA	$ 8,360,000				110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
5-yearly Dam movement survey	PWA	$ 600,000						40,000					40,000					40,000				
20-yearly Dam safety review	PWA	$ 600,000																				
PUMPING STATION		$ -																				
Water pumping cost	PWA	$ 94,311,936				45,977	45,977	45,977	95,226	144,474	193,720	242,965	292,209	341,452	390,694	439,934	489,174	538,412	587,649	636,886	686,121	735,355
Total operating costs		**$ 110,083,461**	$ -	$ -	$ -	**$ 215,977**	**$ 215,977**	**$ 255,977**	**$ 265,226**	**$ 314,474**	**$ 363,720**	**$ 412,965**	**$ 502,209**	**$ 511,452**	**$ 560,694**	**$ 609,934**	**$ 659,174**	**$ 748,412**	**$ 757,649**	**$ 806,886**	**$ 856,121**	**$ 905,355**
Total operating and maintenance costs		**$ 121,833,736**	$ -	$ -	$ -	**$ 291,448**	**$ 291,448**	**$ 331,448**	**$ 340,697**	**$ 389,945**	**$ 439,191**	**$ 488,436**	**$ 577,680**	**$ 662,394**	**$ 711,636**	**$ 760,876**	**$ 810,116**	**$ 896,116**	**$ 906,972**	**$ 956,209**	**$ 1,005,444**	**$ 1,054,678**
Total Costs		**$ 363,691,351**	**$ 55,384,835**	**$ 66,406,340**	**$ 66,406,340**	**$ 291,448**	**$ 291,448**	**$ 331,448**	**$ 340,697**	**$ 389,945**	**$ 439,191**	**$ 488,436**	**$ 577,680**	**$ 662,394**	**$ 711,636**	**$ 760,876**	**$ 810,116**	**$ 1,460,316**	**$ 906,972**	**$ 956,209**	**$ 1,005,444**	**$ 1,054,678**

Estimated costs (2020 $)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals — RCC Dam (incl. destratifier)											2,174,900									
Pumping station	832,000										8,552,700									
Rising main																				
Roads	821,600										2,463,500									
Total renewal costs	**$ 1,653,600**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 13,191,100**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total acquisition costs	**$ 1,653,600**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 13,191,100**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
RCC Dam (incl. destratifier)	32,291	37,356	37,356	37,356	37,356	37,356	37,751	37,751	37,751	37,751	25,416	41,759	41,759	41,759	41,759	41,759	41,759	41,759	41,759	41,759
Pumping station	68,162	98,702	98,702	98,702	98,702	98,702	99,926	99,926	99,926	99,926	14,753	50,086	50,086	50,086	50,086	50,086	50,086	50,086	50,086	50,086
Rising main	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620
Roads	21,246	21,878	21,878	21,878	21,878	21,878	21,878	21,878	21,878	21,878	18,088	29,343	29,343	29,343	29,343	29,343	29,343	29,343	29,343	29,343
Total maintenance costs	**$ 146,779**	**$ 183,016**	**$ 183,016**	**$ 183,016**	**$ 183,016**	**$ 183,016**	**$ 184,635**	**$ 184,635**	**$ 184,635**	**$ 184,635**	**$ 83,337**	**$ 158,808**	**$ 158,808**	**$ 158,808**	**$ 158,808**	**$ 158,808**	**$ 158,808**	**$ 158,808**	**$ 158,808**	**$ 158,808**
Annual Operation/ Inspection	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Destratifier operation	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
5-yearly Dam movement survey	40,000					40,000					40,000					40,000				
20-yearly Dam safety review	200,000																			
Water pumping cost	784,587	833,819	883,050	932,279	981,508	1,030,735	1,079,962	1,129,187	1,178,411	1,227,634	1,276,857	1,326,078	1,375,298	1,424,517	1,473,735	1,522,952	1,572,168	1,621,383	1,670,597	1,719,810
Total operating costs	**$ 1,194,587**	**$ 1,003,819**	**$ 1,053,050**	**$ 1,102,279**	**$ 1,151,508**	**$ 1,240,735**	**$ 1,249,962**	**$ 1,299,187**	**$ 1,348,411**	**$ 1,397,634**	**$ 1,486,857**	**$ 1,496,078**	**$ 1,545,298**	**$ 1,594,517**	**$ 1,643,735**	**$ 1,732,952**	**$ 1,742,168**	**$ 1,791,383**	**$ 1,840,597**	**$ 1,889,810**
Total operating and maintenance costs	**$ 1,341,366**	**$ 1,186,835**	**$ 1,236,066**	**$ 1,285,295**	**$ 1,334,524**	**$ 1,423,751**	**$ 1,434,597**	**$ 1,483,822**	**$ 1,533,046**	**$ 1,582,269**	**$ 1,570,194**	**$ 1,654,886**	**$ 1,704,106**	**$ 1,753,325**	**$ 1,802,543**	**$ 1,891,760**	**$ 1,900,976**	**$ 1,950,191**	**$ 1,999,405**	**$ 2,048,618**
Total Costs	**$ 2,994,966**	**$ 1,186,835**	**$ 1,236,066**	**$ 1,285,295**	**$ 1,334,524**	**$ 1,423,751**	**$ 1,434,597**	**$ 1,483,822**	**$ 1,533,046**	**$ 1,582,269**	**$ 14,761,294**	**$ 1,654,886**	**$ 1,704,106**	**$ 1,753,325**	**$ 1,802,543**	**$ 1,891,760**	**$ 1,900,976**	**$ 1,950,191**	**$ 1,999,405**	**$ 2,048,618**

80 year whole-of-life cost	$ 363,691,351		40 year NPV	$ 209,929,041	2060 yield	7,179 ML/a
80 year NPV	$ 232,319,205	3%		$ 196,325,548	NPV/ML yield	$ 27,347
	$ 204,345,989	5%		$ 187,002,848		
	$ 190,031,915	7%				

Life cycle cost analysis - 20 GL Dunoon Dam

Estimated costs (2020 $)	Source	Total 80 years	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Initial acquistion costs (non-recurring)																						
Capital costs																						
Construction costs (asset renewal life)		$ -																				
RCC Dam (incl. destratifier)	PWA	$ 80,473,250																				
Pumping station	PWA	$ 16,091,790																				
Rising main	PWA	$ 18,901,740																				
Roads	PWA	$ 17,345,900																				
assume same as 50 GL — Indirect costs	RCC (includes pre-construction etc)	$ 55,384,835																				
Total initial capital costs		**$ 188,197,515**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals — RCC Dam (incl. destratifier)	PWA	$ 9,285,900						221,000					2,934,100									
Pumping station	PWA	$ 25,875,200	2,216,500					343,200					988,000									
Rising main	PWA	$ 10,093,200											10,093,200									
Roads	PWA	$ 8,405,800	1,835,600																			
Total renewal costs		**$ 53,660,100**	**$ 4,052,100**	$ -	$ -	$ -	$ -	**$ 564,200**	$ -	$ -	$ -	$ -	**$ 14,015,300**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total acquisition costs		**$ 241,857,615**	**$ 4,052,100**	$ -	$ -	$ -	$ -	**$ 564,200**	$ -	$ -	$ -	$ -	**$ 14,015,300**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ongoing operating and maintenance (recurring)																						
Maintenance costs																						
RCC Dam (incl. destratifier)	PWA	$ 2,744,234	41,759	46,269	46,269	46,269	46,269	45,479	45,874	45,874	45,874	45,874	33,153	40,125	40,125	40,125	40,125	40,125	40,520	40,520	40,520	40,520
Pumping station	PWA	$ 5,004,621	37,706	70,070	70,070	70,070	70,070	70,070	67,622	68,846	68,846	68,846	66,566	98,466	98,466	98,466	98,466	98,466	98,466	99,690	99,690	99,690
Rising main	PWA	$ 1,893,540	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	37,620	-	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540	12,540
Roads	PWA	$ 1,937,892	25,739	29,046	29,046	29,046	29,046	29,046	29,046	29,046	29,046	29,046	29,046	30,458	30,458	30,458	30,458	30,458	30,458	30,458	30,458	30,458
Total maintenance costs		**$ 11,750,275**	**$ 142,824**	**$ 183,005**	**$ 183,005**	**$ 183,005**	**$ 183,005**	**$ 182,215**	**$ 180,162**	**$ 181,386**	**$ 181,386**	**$ 181,386**	**$ 128,765**	**$ 181,589**	**$ 181,589**	**$ 181,589**	**$ 181,589**	**$ 181,589**	**$ 181,984**	**$ 183,208**	**$ 183,208**	**$ 183,208**
Operating costs																						
DAM		$ -																				
Annual Operation/ Inspection	PWA	$ 4,560,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Destratifier operation	PWA	$ 8,360,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
5-yearly Dam movement survey	PWA	$ 600,000	40,000					40,000					40,000					40,000				
20-yearly Dam safety review	PWA	$ 600,000	200,000																			
PUMPING STATION		$ -																				
Water pumping cost	PWA	$ 94,311,936	1,766,444	1,758,495	1,750,581	1,742,704	1,734,862	1,727,055	1,719,283	1,711,546	1,703,844	1,696,177	1,688,544	1,680,946	1,673,381	1,665,851	1,658,355	1,650,892	1,643,463	1,636,068	1,628,705	1,621,376
Total operating costs		**$ 110,083,461**	**$ 2,176,444**	**$ 1,928,495**	**$ 1,920,581**	**$ 1,912,704**	**$ 1,904,862**	**$ 1,937,055**	**$ 1,889,283**	**$ 1,881,546**	**$ 1,873,844**	**$ 1,866,177**	**$ 1,898,544**	**$ 1,850,946**	**$ 1,843,381**	**$ 1,835,851**	**$ 1,828,355**	**$ 1,860,892**	**$ 1,813,463**	**$ 1,806,068**	**$ 1,798,705**	**$ 1,791,376**
Total operating and maintenance costs		**$ 121,833,736**	**$ 2,319,268**	**$ 2,111,500**	**$ 2,103,586**	**$ 2,095,709**	**$ 2,087,867**	**$ 2,119,270**	**$ 2,069,445**	**$ 2,062,932**	**$ 2,055,230**	**$ 2,047,563**	**$ 2,027,309**	**$ 2,032,535**	**$ 2,024,970**	**$ 2,017,440**	**$ 2,009,944**	**$ 2,042,481**	**$ 1,995,447**	**$ 1,989,276**	**$ 1,981,913**	**$ 1,974,584**
Total Costs		**$ 363,691,351**	**$ 6,371,368**	**$ 2,111,500**	**$ 2,103,586**	**$ 2,095,709**	**$ 2,087,867**	**$ 2,683,470**	**$ 2,069,445**	**$ 2,062,932**	**$ 2,055,230**	**$ 2,047,563**	**$ 16,042,609**	**$ 2,032,535**	**$ 2,024,970**	**$ 2,017,440**	**$ 2,009,944**	**$ 2,042,481**	**$ 1,995,447**	**$ 1,989,276**	**$ 1,981,913**	**$ 1,974,584**

Estimated costs (2020 $)	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals — RCC Dam (incl. destratifier)	3,513,900															221,000				
Pumping station	9,384,700										2,871,700					343,200				
Rising main																				
Roads	3,285,100																			
Total renewal costs	**$ 16,183,700**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 2,871,700**	$ -	$ -	$ -	$ -	**$ 564,200**	$ -	$ -	$ -	$ -
Total acquisition costs	**$ 16,183,700**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ 2,871,700**	$ -	$ -	$ -	$ -	**$ 564,200**	$ -	$ -	$ -	$ -
RCC Dam (incl. destratifier)	25,095	34,292	34,292	34,292	34,292	34,292	34,292	34,292	34,292	34,292	34,292	41,582	41,582	41,582	41,582	40,792	41,187	41,187	41,187	41,187
Pumping station	13,237	45,761	45,761	45,761	45,761	45,761	45,761	45,761	45,761	45,761	39,134	73,707	73,707	73,707	73,707	71,259	72,483	72,483	72,483	72,483
Rising main	12,540	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080	25,080
Roads	25,404	27,931	27,931	27,931	27,931	27,931	27,931	27,931	27,931	27,931	27,931	31,238	31,238	31,238	31,238	31,238	31,238	31,238	31,238	31,238
Total maintenance costs	**$ 76,276**	**$ 133,064**	**$ 133,064**	**$ 133,064**	**$ 133,064**	**$ 133,064**	**$ 133,064**	**$ 133,064**	**$ 133,064**	**$ 133,064**	**$ 126,437**	**$ 171,607**	**$ 171,607**	**$ 171,607**	**$ 171,607**	**$ 168,369**	**$ 169,988**	**$ 169,988**	**$ 169,988**	**$ 169,988**
Annual Operation/ Inspection	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Destratifier operation	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000
5-yearly Dam movement survey	40,000					40,000					40,000					40,000				
20-yearly Dam safety review	200,000																			
Water pumping cost	1,614,080	1,606,817	1,599,586	1,592,388	1,585,222	1,578,089	1,570,987	1,563,918	1,556,880	1,549,874	1,542,900	1,535,957	1,529,045	1,522,164	1,515,314	1,508,496	1,501,707	1,494,950	1,488,222	1,481,525
Total operating costs	**$ 2,024,080**	**$ 1,776,817**	**$ 1,769,586**	**$ 1,762,388**	**$ 1,755,222**	**$ 1,788,089**	**$ 1,740,987**	**$ 1,733,918**	**$ 1,726,880**	**$ 1,719,874**	**$ 1,752,900**	**$ 1,705,957**	**$ 1,699,045**	**$ 1,692,164**	**$ 1,685,314**	**$ 1,718,496**	**$ 1,671,707**	**$ 1,664,950**	**$ 1,658,222**	**$ 1,651,525**
Total operating and maintenance costs	**$ 2,100,356**	**$ 1,909,881**	**$ 1,902,650**	**$ 1,895,452**	**$ 1,888,286**	**$ 1,921,153**	**$ 1,874,051**	**$ 1,866,982**	**$ 1,859,944**	**$ 1,852,938**	**$ 1,879,337**	**$ 1,877,564**	**$ 1,870,652**	**$ 1,863,771**	**$ 1,856,921**	**$ 1,886,865**	**$ 1,841,695**	**$ 1,834,938**	**$ 1,828,210**	**$ 1,821,513**
Total Costs	**$ 18,284,056**	**$ 1,909,881**	**$ 1,902,650**	**$ 1,895,452**	**$ 1,888,286**	**$ 1,921,153**	**$ 1,874,051**	**$ 1,866,982**	**$ 1,859,944**	**$ 1,852,938**	**$ 4,751,037**	**$ 1,877,564**	**$ 1,870,652**	**$ 1,863,771**	**$ 1,856,921**	**$ 2,451,065**	**$ 1,841,695**	**$ 1,834,938**	**$ 1,828,210**	**$ 1,821,513**

80 year whole-of-life cost	$ 363,691,351		40 year NPV
80 year NPV	$ 232,319,205	3%	
	$ 204,345,989	5%	
	$ 190,031,915	7%	

Life cycle cost analysis - Marom Creek WTP														
Estimated costs (2020 $)				Total										
				80 years	1	2	3	4	5	6	7	8	9	10
Initial acquistion costs (non-recurring)														
	Capital costs													
		Engineering (20%)	CWT 2018	$ 1,831,750	915,875	915,875		-	-	-	-	-	-	-
		Construction costs (asset renewal life)		$ -	-	-		-	-	-	-	-	-	-
		Marom Creek WTP upgrade		$ 7,327,000	-	-	3,663,500	3,663,500	-	-	-	-	-	-
		Total initial capital costs		$ 9,158,750	$ 915,875	$ 915,875	$ 3,663,500	$ 3,663,500	$ -	$ -	$ -	$ -	$ -	$ -
	Renewals													
		Estimate (2% p.a.)		$ 5,641,791	-	-	1	-	73,270	73,270	73,270	73,270	73,270	73,270
		Total renewal costs		$ 5,641,791	$ -	$ -	$ 1	$ -	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
	Total acquisition costs			$ 14,800,541	$ 915,875	$ 915,875	$ 3,663,501	$ 3,663,500	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
less	Trade-in of item being replaced			$ -	-	-	1	-	-	-	-	-	-	-
	Net acquisition costs			$ 14,800,542	$ 915,875	$ 915,875	$ 3,663,502	$ 3,663,500	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Ongoing operating and maintenance (recurring)														
	Maintenance costs													
		Maintenance	CWT 2018	$ 49,365,702	-	-	1	-	641,113	641,113	641,113	641,113	641,113	641,113
		Total maintenance costs		$ 49,365,702	$ -	$ -	$ 1	$ -	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
	Operating costs													
	Marom Creek WTP	Chemicals	CWT 2018	$ 19,402,383					$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
		Total operating costs		$ 19,402,383	$ -	$ -	$ -	$ -	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
	Total operating and maintenance costs			$ 68,768,085	$ -	$ -	$ 1	$ -	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
	Total Cost Over 80 years			$ 83,568,627										
	Total Annualised costs over 80 years			$ 1,031,711										
	Total Costs			$ 83,568,626	$ 915,875	$ 915,875	$ 3,663,502	$ 3,663,500	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362
	80 year whole-of-life cost	$ 83,568,626												
	80 year NPV	$ 34,971,489	3%	40 year NPV	$ 27,918,427		2060 yield	198	ML/a					
		$ 24,561,843	5%		$ 22,088,688		NPV/ML yield	$ 111,559						
		$ 19,165,441	7%		$ 18,244,868									

	11	12	13	14	15	16	17	18	19	20
Engineering (20%)	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Marom Creek WTP upgrade	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Estimate (2% p.a.)	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270
Total renewal costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Total acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Maintenance	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113
Total maintenance costs	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
Chemicals	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating costs	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating and maintenance costs	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
Total Costs	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362

	21	22	23	24	25	26	27	28	29	30
Engineering (20%)					-	-	-	-	-	-
Construction costs (asset renewal life)					-	-	-	-	-	-
Marom Creek WTP upgrade	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Estimate (2% p.a.)	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270
Total renewal costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Total acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Maintenance	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113
Total maintenance costs	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
Chemicals	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating costs	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating and maintenance costs	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
Total Costs	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362

	31	32	33	34	35	36	37	38	39	40
Engineering (20%)	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Marom Creek WTP upgrade	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Estimate (2% p.a.)	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270
Total renewal costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Total acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Maintenance	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113
Total maintenance costs	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
Chemicals	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating costs	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating and maintenance costs	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
Total Costs	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362

Life cycle cost analysis - Marom Creek WTP														
Estimated costs (2020 $)				Total										
				80 years	41	42	43	44	45	46	47	48	49	50
Initial acquistion costs (non-recurring)														
	Capital costs													
		Engineering (20%)	CWT 2018	$ 1,831,750	-	-	-	-	-	-	-	-	-	-
		Construction costs (asset renewal life)		$ -	-	-	-	-	-	-	-	-	-	-
		Marom Creek WTP upgrade		$ 7,327,000	-	-	-	-	-	-	-	-	-	-
		Total initial capital costs		$ 9,158,750	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Renewals													
		Estimate (2% p.a.)		$ 5,641,791	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270
		Total renewal costs		$ 5,641,791	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
	Total acquisition costs			$ 14,800,541	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
less	Trade-in of item being replaced			$ -	-	-	-	-	-	-	-	-	-	-
	Net acquisition costs			$ 14,800,542	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Ongoing operating and maintenance (recurring)														
	Maintenance costs													
		Maintenance	CWT 2018	$ 49,365,702	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113
		Total maintenance costs		$ 49,365,702	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
	Operating costs													
	Marom Creek WTP	Chemicals	CWT 2018	$ 19,402,383	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
		Total operating costs		$ 19,402,383	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
	Total operating and maintenance costs			$ 68,768,085	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
	Total Cost Over 80 years			$ 83,568,627										
	Total Annualised costs over 80 years			$ 1,031,711										
	Total Costs			$ 83,568,626	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362
	80 year whole-of-life cost	$ 83,568,626												
	80 year NPV	$ 34,971,489	3%	40 year NPV										
		$ 24,561,843	5%											
		$ 19,165,441	7%											

	51	52	53	54	55	56	57	58	59	60
Engineering (20%)	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Marom Creek WTP upgrade	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Estimate (2% p.a.)	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270
Total renewal costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Total acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Maintenance	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113
Total maintenance costs	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
Chemicals	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating costs	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating and maintenance costs	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
Total Costs	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362

	61	62	63	64	65	66	67	68	69	70
Engineering (20%)	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Marom Creek WTP upgrade	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Estimate (2% p.a.)	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270
Total renewal costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Total acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Maintenance	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113
Total maintenance costs	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
Chemicals	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating costs	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating and maintenance costs	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
Total Costs	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362

	71	72	73	74	75	76	77	78	79	80	81
Engineering (20%)	-	-	-	-	-	-	-				
Construction costs (asset renewal life)	-	-	-	-	-	-	-				
Marom Creek WTP upgrade	-	-	-	-	-	-	-				
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Estimate (2% p.a.)	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270	73,270
Total renewal costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Total acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Trade-in of item being replaced	-	-	-	-	-	-	-				
Net acquisition costs	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270	$ 73,270
Maintenance	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113	641,113
Total maintenance costs	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113	$ 641,113
Chemicals	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating costs	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979	$ 251,979
Total operating and maintenance costs	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092	$ 893,092
Total Costs	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362	$ 966,362

Life cycle cost analysis - Woodburn Option (based on costing for Alstonville)

Estimated costs (2020 $)	Source	Total 80 years	1	2	3	4	5	6	7	8	9	10
Initial acquistion costs (non-recurring)												
Capital costs												
Scheme investigation costs	Jacobs 2020	$ 492,000	492,000	-	-	-	-	-	-	-	-	-
Design and documentation costs	Jacobs 2020	$ 1,720,000	-	1,720,000	-	-	-	-	-	-	-	-
Environmental approval costs	Jacobs 2020	$ 985,000	-	-	985,000	-	-	-	-	-	-	-
Project management costs	Jacobs 2020	$ 615,000	-	-	615,000	-	-	-	-	-	-	-
land acquistion costs	existing site	$ -	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)		$ -	-	-	-		-	-	-	-	-	-
Bores (50 years)	Jacobs 2020 cost for 2 bores x3/2	$ 1,485,000				1,485,000						
Mechanical (25 years)	Jacobs 2020	$ 6,740,000				6,740,000						
Electrical (25 years)	Jacobs 2020	$ 5,120,000				5,120,000						
Civil including Pipelines (85 years)	Jacobs 2020	$ 16,250,000				16,250,000						
Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 2,090,000				2,090,000						
Integration costs												
Existing supply network modifications		$ 985,000	-	-	985,000	-	-	-	-	-	-	-
Existing facility modifications		$ -	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
Total initial capital costs		**$ 36,482,000**	$ 492,000	$ 1,720,000	$ 2,585,000	$ 31,685,000	$ -	$ -	$ -	$ -	$ -	$ -
Renewals												
Repairs/unscheduled maintenance	Jacobs 2020	$ 15,823,077	-	-	-	-	140,000	141,400	142,814	144,242	145,685	147,141
Upgrades and refurbishments	Jacobs 2020	$ 600,000	-	-	-	-	-	-	-	-	-	50,000
Spare parts and accessories	Jacobs 2020	$ 3,990,000	-	-	-	-	15,000	16,000	17,000	18,000	19,000	20,000
Bores Renewals (50 years)	Jacobs 2020	$ 1,485,000										
Mechanical Renewals (25 years)	Jacobs 2020	$ 20,220,000										
Electrical Renewals (25 years)	Jacobs 2020	$ 15,360,000										
Civil including Pipelines Renewals (85 years)		$ -										
Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 10,450,000										
Other repair costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
Major filter renewals		$ -	-	-	-	-	-	-	-	-	-	-
		$ -	-	-	-	-	-	-	-	-	-	-
Total renewal costs		**$ 67,928,077**	$ -	$ -	$ -	$ -	$ 155,000	$ 157,400	$ 159,814	$ 162,242	$ 164,685	$ 217,141
Total acquisition costs		**$ 104,410,077**	$ 492,000	$ 1,720,000	$ 2,585,000	$ 31,685,000	$ 155,000	$ 157,400	$ 159,814	$ 162,242	$ 164,685	$ 217,141
Ongoing operating and maintenance (recurring)												
Maintenance costs												
Scheduled/preventative maintenance	Jacobs 2020	$ 12,040,300	-	-	-	-	158,425	158,425	158,425	158,425	158,425	158,425
Waste disposal	Jacobs 2020	$ 1,064,000	-	-	-	-	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
		$ -	-	-	-	-	-	-	-	-	-	-
Total maintenance costs		**$ 13,104,300**	$ -	$ -	$ -	$ -	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425
Operating costs												
Staffing costs - Borefield and Transfer	Jacobs 2020	$ 4,560,000	-	-	-	-	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	Jacobs 2020	$ 9,880,000					130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	Jacobs 2020	$ 9,120,000	-	-	-	-	120,000	120,000	120,000	120,000	120,000	120,000
Utilities - GWTP	Jacobs 2020	$ 10,944,000					144,000	144,000	144,000	144,000	144,000	144,000
Chemical Supplies and consumables	Jacobs 2020	$ 12,160,000	-	-	-	-	160,000	160,000	160,000	160,000	160,000	160,000
Training	Jacobs 2020	$ 114,000	-	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring		$ -	-	-	-	-	-	-	-	-	-	-
Licences	Jacobs 2020	$ 1,900,000	-	-	-	-	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
Support Costs	Jacobs 2020	$ 3,610,000	-	-	-	-	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs		**$ 52,288,000**	$ -	$ -	$ -	$ -	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000
Total operating and maintenance costs		**$ 65,392,300**	$ -	$ -	$ -	$ -	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425
Total disposal costs		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Cost Over 80 years		$ 169,802,377										
Total Annualised costs over 80 years		$ 2,122,529.71										
Total Costs		$ 169,802,377	$ 492,000	$ 1,720,000	$ 2,585,000	$ 31,685,000	$ 1,015,425	$ 1,017,825	$ 1,020,239	$ 1,022,667	$ 1,025,110	$ 1,077,566
80 year whole-of-life cost $ 169,802,377					40 year NPV	$ 61,969,913		2060 yield	698			
80 year NPV $ 75,515,541	3%					$ 51,230,292		NPV/ML yield	$ 73,396			
$ 55,817,346	5%					$ 44,018,800						
$ 45,670,973	7%											

Estimated costs (2020 $)	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Scheme investigation costs	-	-	-	-	-	-	-	-	-					-	-
Design and documentation costs	-	-	-	-	-	-	-	-	-					-	-
Environmental approval costs	-	-	-	-	-	-	-	-	-					-	-
Project management costs	-	-	-	-	-	-	-	-	-					-	-
land acquistion costs	-	-	-	-	-	-	-	-	-					-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-					-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	148,613	150,099	151,600	153,116	154,647	156,194	157,756	159,333	160,926	162,536	164,161	165,803	167,461	169,135	170,827
Upgrades and refurbishments	-	-	-	-	-	50,000	-	-	-	-	-	50,000	-	-	-
Spare parts and accessories	21,000	22,000	23,000	24,000	25,000	26,000	27,000	28,000	29,000	30,000	31,000	32,000	33,000	34,000	35,000
Instrumentation Control Communications (15 yrs)									2,090,000						
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major filter renewals	-		-	-	-	-	-	-	-		-	-	-		-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 169,613	$ 172,099	$ 174,600	$ 177,116	$ 179,647	$ 232,194	$ 184,756	$ 187,333	$ 2,279,926	$ 192,536	$ 195,161	$ 247,803	$ 200,461	$ 203,135	$ 205,827
Total acquisition costs	$ 169,613	$ 172,099	$ 174,600	$ 177,116	$ 179,647	$ 232,194	$ 184,756	$ 187,333	$ 2,279,926	$ 192,536	$ 195,161	$ 247,803	$ 200,461	$ 203,135	$ 205,827
Scheduled/preventative maintenance	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Utilities - GWTP	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Chemical Supplies and consumables	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000
Total operating and maintenance costs	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,030,038	$ 1,032,524	$ 1,035,025	$ 1,037,541	$ 1,040,072	$ 1,092,619	$ 1,045,181	$ 1,047,758	$ 3,140,351	$ 1,052,961	$ 1,055,586	$ 1,108,228	$ 1,060,886	$ 1,063,560	$ 1,066,252

Estimated costs (2020 $)	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Design and documentation costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environmental approval costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project management costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
land acquistion costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	172,535	174,260	176,003	177,763	179,540	181,336	183,149	184,981	186,831	188,699	190,586	192,492	194,417	196,361	198,324
Upgrades and refurbishments	-	-	50,000	-	-	-	-	-	50,000	-	-	-	-	-	50,000
Spare parts and accessories	36,000	37,000	38,000	39,000	40,000	41,000	42,000	43,000	44,000	45,000	46,000	47,000	48,000	49,000	50,000
Mechanical Renewals (25 years)				6,740,000											
Electrical Renewals (25 years)				5,120,000											
Instrumentation Control Communications (15 yrs)									2,090,000						
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 208,535	$ 211,260	$ 264,003	$ 12,076,763	$ 219,540	$ 222,336	$ 225,149	$ 227,981	$ 2,370,831	$ 233,699	$ 236,586	$ 239,492	$ 242,417	$ 245,361	$ 298,324
Total acquisition costs	$ 208,535	$ 211,260	$ 264,003	$ 12,076,763	$ 219,540	$ 222,336	$ 225,149	$ 227,981	$ 2,370,831	$ 233,699	$ 236,586	$ 239,492	$ 242,417	$ 245,361	$ 298,324
Scheduled/preventative maintenance	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Utilities - GWTP	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Chemical Supplies and consumables	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000
Total operating and maintenance costs	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,068,960	$ 1,071,685	$ 1,124,428	$ 12,937,188	$ 1,079,965	$ 1,082,761	$ 1,085,574	$ 1,088,406	$ 3,231,256	$ 1,094,124	$ 1,097,011	$ 1,099,917	$ 1,102,842	$ 1,105,786	$ 1,158,749

Life cycle cost analysis - Woodburn Option (based on costing for Alstonville)

Estimated costs (2020 $)	Source	Total 80 years	41	42	43	44	45	46	47	48	49	50
Initial acquistion costs (non-recurring)												
Capital costs												
Scheme investigation costs	Jacobs 2020	$ 492,000	-	-	-	-	-	-	-	-	-	-
Design and documentation costs	Jacobs 2020	$ 1,720,000	-	-	-	-	-	-	-	-	-	-
Environmental approval costs	Jacobs 2020	$ 985,000	-	-	-	-	-	-	-	-	-	-
Project management costs	Jacobs 2020	$ 615,000	-	-	-	-	-	-	-	-	-	-
land acquistion costs	existing site	$ -	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)		$ -	-	-	-	-	-	-	-	-	-	-
Bores (50 years)	Jacobs 2020 cost for 2 bores x3/2	$ 1,485,000										
Mechanical (25 years)	Jacobs 2020	$ 6,740,000										
Electrical (25 years)	Jacobs 2020	$ 5,120,000										
Civil including Pipelines (85 years)	Jacobs 2020	$ 16,250,000										
Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 2,090,000										
Integration costs												
Existing supply network modifications		$ 985,000	-	-	-	-	-	-	-	-	-	-
Existing facility modifications		$ -	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
Total initial capital costs		**$ 36,482,000**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals												
Repairs/unscheduled maintenance	Jacobs 2020	$ 15,823,077	200,308	202,311	204,334	206,377	208,441	210,525	212,631	214,757	216,904	219,074
Upgrades and refurbishments	Jacobs 2020	$ 600,000	-	-	-	-	-	50,000	-	-	-	-
Spare parts and accessories	Jacobs 2020	$ 3,990,000	51,000	52,000	53,000	54,000	55,000	56,000	57,000	58,000	59,000	60,000
Bores Renewals (50 years)	Jacobs 2020	$ 1,485,000										
Mechanical Renewals (25 years)	Jacobs 2020	$ 20,220,000										
Electrical Renewals (25 years)	Jacobs 2020	$ 15,360,000										
Civil including Pipelines Renewals (85 years)		$ -										
Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 10,450,000									2,090,000	
Other repair costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
Major filter renewals		$ -										
		$ -	-	-	-	-	-	-	-	-	-	-
Total renewal costs		**$ 67,928,077**	$ 251,308	$ 254,311	$ 257,334	$ 260,377	$ 263,441	$ 316,525	$ 269,631	$ 272,757	$ 2,365,904	$ 279,074
Total acquisition costs		**$ 104,410,077**	$ 251,308	$ 254,311	$ 257,334	$ 260,377	$ 263,441	$ 316,525	$ 269,631	$ 272,757	$ 2,365,904	$ 279,074
Ongoing operating and maintenance (recurring)												
Maintenance costs												
Scheduled/preventative maintenance	Jacobs 2020	$ 12,040,300	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425
Waste disposal	Jacobs 2020	$ 1,064,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
		$ -	-	-	-	-	-	-	-	-	-	-
Total maintenance costs		**$ 13,104,300**	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425
Operating costs												
Staffing costs - Borefield and Transfer	Jacobs 2020	$ 4,560,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	Jacobs 2020	$ 9,880,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	Jacobs 2020	$ 9,120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Utilities - GWTP	Jacobs 2020	$ 10,944,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Chemical Supplies and consumables	Jacobs 2020	$ 12,160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000
Training	Jacobs 2020	$ 114,000	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring		$ -	-	-	-	-	-	-	-	-	-	-
Licences	Jacobs 2020	$ 1,900,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)		$ -	-	-	-	-	-	-	-	-	-	-
Support Costs	Jacobs 2020	$ 3,610,000	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs		**$ 52,288,000**	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000
Total operating and maintenance costs		**$ 65,392,300**	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425
Total disposal costs		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Cost Over 80 years		$ 169,802,377										
Total Annualised costs over 80 years		$ 2,122,529.71										
Total Costs		$ 169,802,377	$ 1,111,733	$ 1,114,736	$ 1,117,759	$ 1,120,802	$ 1,123,866	$ 1,176,950	$ 1,130,056	$ 1,133,182	$ 3,226,329	$ 1,139,499
80 year whole-of-life cost $ 169,802,377												
80 year NPV $ 75,515,541	3%											
$ 55,817,346	5%											
$ 45,670,973	7%											

Estimated costs (2020 $)	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Design and documentation costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environmental approval costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project management costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
land acquistion costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	221,264	223,477	225,712	227,969	230,248	232,551	234,876	237,225	239,597	241,993	244,413	246,858	249,326	251,819	254,338
Upgrades and refurbishments	-	50,000	-	-	-	-	-	50,000	-	-	-	-	-	50,000	-
Spare parts and accessories	61,000	62,000	63,000	64,000	65,000	66,000	67,000	68,000	69,000	70,000	71,000	72,000	73,000	74,000	75,000
Bores Renewals (50 years)				1,485,000											
Mechanical Renewals (25 years)				6,740,000											
Electrical Renewals (25 years)				5,120,000											
Instrumentation Control Communications (15 yrs)														2,090,000	
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 282,264	$ 335,477	$ 288,712	$ 13,636,969	$ 295,248	$ 298,551	$ 301,876	$ 355,225	$ 308,597	$ 311,993	$ 315,413	$ 318,858	$ 322,326	$ 2,465,819	$ 329,338
Total acquisition costs	$ 282,264	$ 335,477	$ 288,712	$ 13,636,969	$ 295,248	$ 298,551	$ 301,876	$ 355,225	$ 308,597	$ 311,993	$ 315,413	$ 318,858	$ 322,326	$ 2,465,819	$ 329,338
Scheduled/preventative maintenance	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Utilities - GWTP	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Chemical Supplies and consumables	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000
Total operating and maintenance costs	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,142,689	$ 1,195,902	$ 1,149,137	$ 14,497,394	$ 1,155,673	$ 1,158,976	$ 1,162,301	$ 1,215,650	$ 1,169,022	$ 1,172,418	$ 1,175,838	$ 1,179,283	$ 1,182,751	$ 3,326,244	$ 1,189,763

Estimated costs (2020 $)	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-	-				
Design and documentation costs	-	-	-	-	-	-	-	-	-	-	-				
Environmental approval costs	-	-	-	-	-	-	-	-	-	-	-				
Project management costs	-	-	-	-	-	-	-	-	-	-	-				
land acquistion costs	-	-	-	-	-	-	-	-	-	-	-				
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-	-				
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-				
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-				
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-				
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Repairs/unscheduled maintenance	256,881	259,450	262,044	264,665	267,311	269,984	272,684	275,411	278,165	280,947	283,756	286,594	289,460	292,354	295,278
Upgrades and refurbishments	-	-	-	-	50,000	-	-	-	-	-	50,000				
Spare parts and accessories	76,000	77,000	78,000	79,000	80,000	81,000	82,000	83,000	84,000	85,000	86,000	87,000	88,000	89,000	90,000
Mechanical Renewals (25 years)														6,740,000	
Electrical Renewals (25 years)														5,120,000	
Instrumentation Control Communications (15 yrs)														2,090,000	
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-				
	-	-	-	-	-	-	-	-	-	-	-				
Total renewal costs	$ 332,881	$ 336,450	$ 340,044	$ 343,665	$ 397,311	$ 350,984	$ 354,684	$ 358,411	$ 362,165	$ 365,947	$ 419,756	$ 373,594	$ 377,460	$ 14,331,354	$ 385,278
Total acquisition costs	$ 332,881	$ 336,450	$ 340,044	$ 343,665	$ 397,311	$ 350,984	$ 354,684	$ 358,411	$ 362,165	$ 365,947	$ 419,756	$ 373,594	$ 377,460	$ 14,331,354	$ 385,278
Scheduled/preventative maintenance	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425	158,425
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-				
	-	-	-	-	-	-	-	-	-	-	-				
Total maintenance costs	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425	$ 172,425
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Utilities - GWTP	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Chemical Supplies and consumables	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-				
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-				
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000	$ 688,000
Total operating and maintenance costs	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425	$ 860,425
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,193,306	$ 1,196,875	$ 1,200,469	$ 1,204,090	$ 1,257,736	$ 1,211,409	$ 1,215,109	$ 1,218,836	$ 1,222,590	$ 1,226,372	$ 1,280,181	$ 1,234,019	$ 1,237,885	$ 15,191,779	$ 1,245,703

Life cycle cost analysis - Alstonville Option

Estimated costs ($'s)	Item	Source	Total all years	1	2	3	4
Initial acquistion costs (non-recurring)							
Capital costs							
	Scheme investigation costs	Jacobs 2020	$ 492,000	492,000	-	-	-
	Design and documentation costs	Jacobs 2020	$ 1,720,000	-	1,720,000	-	-
	Environmental approval costs	Jacobs 2020	$ 985,000	-	985,000	-	-
	Project management costs	Jacobs 2020	$ 615,000	-	615,000	-	-
	land acquistion costs	Jacobs 2020	$ 3,800,000	-	3,800,000	-	-
	Construction costs (asset renewal life)		$ -	-	-	-	-
	Bores (50 years)	Jacobs 2020	$ 990,000			495,000	495,000
	Mechanical (25 years)	Jacobs 2020	$ 6,740,000			3,370,000	3,370,000
	Electrical (25 years)	Jacobs 2020	$ 5,120,000			2,560,000	2,560,000
	Civil including Pipelines (85 years)	Jacobs 2020	$ 16,250,000			8,125,000	8,125,000
	Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 2,090,000			1,045,000	1,045,000
Integration costs							
	Existing supply network modifications		$ 985,000	-	-	492,500	492,500
	Existing facility modifications		$ -	-	-	-	-
	Other capital costs (specify)		$ -	-	-	-	-
							-
Marom creek WTP	land acquistion savings	Jacobs 2020	-$ 2,531,000			(1,265,500)	(1,265,500)
	conventional water treatment plant savings	Jacobs 2020	-$ 6,650,000			(3,325,000)	(3,325,000)
	Ozone/bac Process after conventional water treat	Jacobs 2020	-$ 6,995,000			(3,497,500)	(3,497,500)
	clear water storage	Jacobs 2020	-$ 2,750,000			(1,375,000)	(1,375,000)
	disinfection	Jacobs 2020	-$ 1,520,000			(760,000)	(760,000)
	Treated water pipeline	Jacobs 2020	$ 6,600,000			3,300,000	3,300,000
				-	-	-	-
	Total initial capital costs		**$ 25,941,000**	$ 492,000	$ 7,120,000	$ 9,164,500	$ 9,164,500
Renewals							
	Repairs/unscheduled maintenance	Jacobs 2020	$ 15,823,077	-	-	-	-
	Upgrades and refurbishments	Jacobs 2020	$ 600,000	-	-	-	-
	Spare parts and accessories	Jacobs 2020	$ 3,990,000	-	-	-	-
	Bores Renewals (50 years)	Jacobs 2020	$ 990,000				
	Mechanical Renewals (25 years)	Jacobs 2020	$ 20,220,000				
	Electrical Renewals (25 years)	Jacobs 2020	$ 15,360,000				
	Civil including Pipelines Renewals (85 years)		$ -				
	Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 10,450,000				
	Other repair costs (specify)		$ -	-	-	-	-
	Major filter renewals		$ -	-	-	-	-
			$ -	-	-	-	-
	Total renewal costs		**$ 67,433,077**	$ -	$ -	$ -	$ -
Total acquisition costs			**$ 93,374,077**	$ 492,000	$ 7,120,000	$ 9,164,500	$ 9,164,500
Ongoing operating and maintenance (recurring)							
Maintenance costs							
	Scheduled/preventative maintenance	Jacobs 2020	$ 3,482,510	-	-	-	-
	Waste disposal	Jacobs 2020	$ 1,064,000	-	-	-	-
	Other maintenance costs (specify)		$ -	-	-	-	-
	Total maintenance costs		**$ 4,546,510**	$ -	$ -	$ -	$ -
Operating costs							
	Staffing costs - Borefield and Transfer	Jacobs 2020	$ 4,560,000	-	-	-	-
	Staffing costs - GWTP	Jacobs 2020	$ 9,880,000				
	Utilities - Borefield and Transfer	Jacobs 2020	$ 7,296,000	-	-	-	-
	Utilities - GWTP	Jacobs 2020	$ 8,755,200				
	Chemical Supplies and consumables	Jacobs 2020	$ 9,728,000	-	-	-	-
	Training	Jacobs 2020	$ 114,000	-	-	-	-
	WQ monitoring		$ -	-	-	-	-
	Licences	Jacobs 2020	$ 1,900,000	-	-	-	-
	Other operating costs (specify)		$ -	-	-	-	-
	Support Costs	Jacobs 2020	$ 3,610,000	-	-	-	-
	Total operating costs		**$ 45,843,200**	$ -	$ -	$ -	$ -
Total operating and maintenance costs			**$ 50,389,710**	$ -	$ -	$ -	$ -
Total disposal costs			$ -	$ -	$ -	$ -	$ -
Total Cost Over 80 years			**$ 143,763,787**				
Total Annualised costs over 80 years			**$ 1,797,047.33**				
Total Costs			**$ 143,763,787**	**$ 492,000**	**$ 7,120,000**	**$ 9,164,500**	**$ 9,164,500**

Item	5	6	7	8	9	10	11	12	13	14	15	16
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-	-	-
Design and documentation costs	-	-	-	-	-	-	-	-	-	-	-	-
Environmental approval costs	-	-	-	-	-	-	-	-	-	-	-	-
Project management costs	-	-	-	-	-	-	-	-	-	-	-	-
land acquistion costs	-	-	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	140,000	141,400	142,814	144,242	145,685	147,141	148,613	150,099	151,600	153,116	154,647	156,194
Upgrades and refurbishments	-	-	-	-	-	50,000	-	-	-	-	-	50,000
Spare parts and accessories	15,000	16,000	17,000	18,000	19,000	20,000	21,000	22,000	23,000	24,000	25,000	26,000
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Major filter renewals	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 155,000	$ 157,400	$ 159,814	$ 162,242	$ 164,685	$ 217,141	$ 169,613	$ 172,099	$ 174,600	$ 177,116	$ 179,647	$ 232,194
Total acquisition costs	$ 155,000	$ 157,400	$ 159,814	$ 162,242	$ 164,685	$ 217,141	$ 169,613	$ 172,099	$ 174,600	$ 177,116	$ 179,647	$ 232,194
Scheduled/preventative maintenance	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Utilities - GWTP	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200
Chemical Supplies and consumables	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200
Total operating and maintenance costs	663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023
Total disposal costs	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	**818,023**	**$ 820,423**	**$ 822,837**	**$ 825,265**	**$ 827,707**	**$ 880,164**	**$ 832,635**	**$ 835,121**	**$ 837,622**	**$ 840,138**	**$ 842,670**	**$ 895,216**

Item	17	18	19	20	21	22	23	24	25	26	27	28
Scheme investigation costs	-	-	-					-	-	-	-	-
Design and documentation costs	-	-	-					-	-	-	-	-
Environmental approval costs	-	-	-					-	-	-	-	-
Project management costs	-	-	-					-	-	-	-	-
land acquistion costs	-	-	-					-	-	-	-	-
Construction costs (asset renewal life)	-	-	-					-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	157,756	159,333	160,926	162,536	164,161	165,803	167,461	169,135	170,827	172,535	174,260	176,003
Upgrades and refurbishments	-	-	-	-	-	50,000	-	-	-	-	-	50,000
Spare parts and accessories	27,000	28,000	29,000	30,000	31,000	32,000	33,000	34,000	35,000	36,000	37,000	38,000
Instrumentation Control Communications (15 yrs)			2,090,000									
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Major filter renewals	-	-	-	-	-	-	-		-			
	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 184,756	$ 187,333	$ 2,279,926	$ 192,536	$ 195,161	$ 247,803	$ 200,461	$ 203,135	$ 205,827	$ 208,535	$ 211,260	$ 264,003
Total acquisition costs	$ 184,756	$ 187,333	$ 2,279,926	$ 192,536	$ 195,161	$ 247,803	$ 200,461	$ 203,135	$ 205,827	$ 208,535	$ 211,260	$ 264,003
Scheduled/preventative maintenance	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Utilities - GWTP	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200
Chemical Supplies and consumables	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200
Total operating and maintenance costs	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	**$ 847,778**	**$ 850,356**	**$ 2,942,949**	**$ 855,558**	**$ 858,184**	**$ 910,825**	**$ 863,483**	**$ 866,158**	**$ 868,849**	**$ 871,557**	**$ 874,283**	**$ 927,025**

Item	29	30	31	32	33	34	35	36	37	38	39	40
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-	-	-
Design and documentation costs	-	-	-	-	-	-	-	-	-	-	-	-
Environmental approval costs	-	-	-	-	-	-	-	-	-	-	-	-
Project management costs	-	-	-	-	-	-	-	-	-	-	-	-
land acquistion costs	-	-	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	177,763	179,540	181,336	183,149	184,981	186,831	188,699	190,586	192,492	194,417	196,361	198,324
Upgrades and refurbishments	-	-	-	-	-	50,000	-	-	-	-	-	50,000
Spare parts and accessories	39,000	40,000	41,000	42,000	43,000	44,000	45,000	46,000	47,000	48,000	49,000	50,000
Mechanical Renewals (25 years)	6,740,000											
Electrical Renewals (25 years)	5,120,000											
Instrumentation Control Communications (15 yrs)						2,090,000						
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 12,076,763	$ 219,540	$ 222,336	$ 225,149	$ 227,981	$ 2,370,831	$ 233,699	$ 236,586	$ 239,492	$ 242,417	$ 245,361	$ 298,324
Total acquisition costs	$ 12,076,763	$ 219,540	$ 222,336	$ 225,149	$ 227,981	$ 2,370,831	$ 233,699	$ 236,586	$ 239,492	$ 242,417	$ 245,361	$ 298,324
Scheduled/preventative maintenance	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Utilities - GWTP	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200
Chemical Supplies and consumables	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200
Total operating and maintenance costs	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	**$ 12,739,785**	**$ 882,563**	**$ 885,358**	**$ 888,172**	**$ 891,003**	**$ 3,033,853**	**$ 896,721**	**$ 899,608**	**$ 902,514**	**$ 905,439**	**$ 908,383**	**$ 961,347**

80 year whole-of-life cost	$ 143,763,787					
80 year NPV	$ 60,862,511	3%	40 year NPV	$ 48,860,970	2060 yield	916 ML/a
	$ 44,109,829	5%		$ 40,065,265	NPV/ML yield	$ 43,739
	$ 35,778,806	7%		$ 34,328,399		

Life cycle cost analysis - Alstonville Option

Estimated costs ($'s)	Item	Source	Total all years
Initial acquistion costs (non-recurring)			
Capital costs			
	Scheme investigation costs	Jacobs 2020	$ 492,000
	Design and documentation costs	Jacobs 2020	$ 1,720,000
	Environmental approval costs	Jacobs 2020	$ 985,000
	Project management costs	Jacobs 2020	$ 615,000
	land acquistion costs	Jacobs 2020	$ 3,800,000
	Construction costs (asset renewal life)		$ -
	Bores (50 years)	Jacobs 2020	$ 990,000
	Mechanical (25 years)	Jacobs 2020	$ 6,740,000
	Electrical (25 years)	Jacobs 2020	$ 5,120,000
	Civil including Pipelines (85 years)	Jacobs 2020	$ 16,250,000
	Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 2,090,000
Integration costs			
	Existing supply network modifications		$ 985,000
	Existing facility modifications		$ -
	Other capital costs (specify)		$ -
Marom creek WTP	land acquistion savings	Jacobs 2020	-$ 2,531,000
	conventional water treatment plant savings	Jacobs 2020	-$ 6,650,000
	Ozone/bac Process after conventional water treat	Jacobs 2020	-$ 6,995,000
	clear water storage	Jacobs 2020	-$ 2,750,000
	disinfection	Jacobs 2020	-$ 1,520,000
	Treated water pipeline	Jacobs 2020	$ 6,600,000
	Total initial capital costs		**$ 25,941,000**
Renewals			
	Repairs/unscheduled maintenance	Jacobs 2020	$ 15,823,077
	Upgrades and refurbishments	Jacobs 2020	$ 600,000
	Spare parts and accessories	Jacobs 2020	$ 3,990,000
	Bores Renewals (50 years)	Jacobs 2020	$ 990,000
	Mechanical Renewals (25 years)	Jacobs 2020	$ 20,220,000
	Electrical Renewals (25 years)	Jacobs 2020	$ 15,360,000
	Civil including Pipelines Renewals (85 years)		$ -
	Instrumentation Control Communications (15 yrs)	Jacobs 2020	$ 10,450,000
	Other repair costs (specify)		$ -
	Major filter renewals		$ -
			$ -
	Total renewal costs		**$ 67,433,077**
Total acquisition costs			**$ 93,374,077**
Ongoing operating and maintenance (recurring)			
Maintenance costs			
	Scheduled/preventative maintenance	Jacobs 2020	$ 3,482,510
	Waste disposal	Jacobs 2020	$ 1,064,000
	Other maintenance costs (specify)		$ -
	Total maintenance costs		**$ 4,546,510**
Operating costs			
	Staffing costs - Borefield and Transfer	Jacobs 2020	$ 4,560,000
	Staffing costs - GWTP	Jacobs 2020	$ 9,880,000
	Utilities - Borefield and Transfer	Jacobs 2020	$ 7,296,000
	Utilities - GWTP	Jacobs 2020	$ 8,755,200
	Chemical Supplies and consumables	Jacobs 2020	$ 9,728,000
	Training	Jacobs 2020	$ 114,000
	WQ monitoring		$ -
	Licences	Jacobs 2020	$ 1,900,000
	Other operating costs (specify)		$ -
	Support Costs	Jacobs 2020	$ 3,610,000
	Total operating costs		**$ 45,843,200**
Total operating and maintenance costs			**$ 50,389,710**
Total disposal costs			$ -
Total Cost Over 80 years			**$ 143,763,787**
Total Annualised costs over 80 years			**$ 1,797,047.33**
Total Costs			**$ 143,763,787**

Item	41	42	43	44	45	46	47	48	49	50	51	52	53
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Design and documentation costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Environmental approval costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Project management costs	-	-	-	-	-	-	-	-	-	-	-	-	-
land acquistion costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	200,308	202,311	204,334	206,377	208,441	210,525	212,631	214,757	216,904	219,074	221,264	223,477	225,712
Upgrades and refurbishments	-	-	-	-	-	50,000	-	-	-	-	-	50,000	-
Spare parts and accessories	51,000	52,000	53,000	54,000	55,000	56,000	57,000	58,000	59,000	60,000	61,000	62,000	63,000
Instrumentation Control Communications (15 yrs)									2,090,000				
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 251,308	$ 254,311	$ 257,334	$ 260,377	$ 263,441	$ 316,525	$ 269,631	$ 272,757	$ 2,365,904	$ 279,074	$ 282,264	$ 335,477	$ 288,712
Total acquisition costs	$ 251,308	$ 254,311	$ 257,334	$ 260,377	$ 263,441	$ 316,525	$ 269,631	$ 272,757	$ 2,365,904	$ 279,074	$ 282,264	$ 335,477	$ 288,712
Scheduled/preventative maintenance	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Utilities - GWTP	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200
Chemical Supplies and consumables	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200
Total operating and maintenance costs	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	**$ 914,330**	**$ 917,333**	**$ 920,356**	**$ 923,400**	**$ 926,463**	**$ 979,548**	**$ 932,653**	**$ 935,779**	**$ 3,028,927**	**$ 942,096**	**$ 945,287**	**$ 998,499**	**$ 951,734**

Item	54	55	56	57	58	59	60	61	62	63	64	65	66
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Design and documentation costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Environmental approval costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Project management costs	-	-	-	-	-	-	-	-	-	-	-	-	-
land acquistion costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	227,969	230,248	232,551	234,876	237,225	239,597	241,993	244,413	246,858	249,326	251,819	254,338	256,881
Upgrades and refurbishments	-	-	-	-	50,000	-	-	-	-	-	50,000	-	-
Spare parts and accessories	64,000	65,000	66,000	67,000	68,000	69,000	70,000	71,000	72,000	73,000	74,000	75,000	76,000
Bores Renewals (50 years)	990,000												
Mechanical Renewals (25 years)	6,740,000												
Electrical Renewals (25 years)	5,120,000												
Instrumentation Control Communications (15 yrs)											2,090,000		
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 13,141,969	$ 295,248	$ 298,551	$ 301,876	$ 355,225	$ 308,597	$ 311,993	$ 315,413	$ 318,858	$ 322,326	$ 2,465,819	$ 329,338	$ 332,881
Total acquisition costs	$ 13,141,969	$ 295,248	$ 298,551	$ 301,876	$ 355,225	$ 308,597	$ 311,993	$ 315,413	$ 318,858	$ 322,326	$ 2,465,819	$ 329,338	$ 332,881
Scheduled/preventative maintenance	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Utilities - GWTP	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200
Chemical Supplies and consumables	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200
Total operating and maintenance costs	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	**$ 13,804,991**	**$ 958,271**	**$ 961,573**	**$ 964,899**	**$ 1,018,248**	**$ 971,620**	**$ 975,016**	**$ 978,436**	**$ 981,880**	**$ 985,349**	**$ 3,128,842**	**$ 992,360**	**$ 995,903**

Item	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Scheme investigation costs	-	-	-	-	-	-	-	-	-	-				
Design and documentation costs	-	-	-	-	-	-	-	-	-	-				
Environmental approval costs	-	-	-	-	-	-	-	-	-	-				
Project management costs	-	-	-	-	-	-	-	-	-	-				
land acquistion costs	-	-	-	-	-	-	-	-	-	-				
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-				
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-				
Existing facility modifications	-	-	-	-	-	-	-	-	-	-				
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-				
	-	-	-	-	-	-	-	-	-	-				
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Repairs/unscheduled maintenance	259,450	262,044	264,665	267,311	269,984	272,684	275,411	278,165	280,947	283,756	286,594	289,460	292,354	295,278
Upgrades and refurbishments	-	-	-	50,000	-	-	-	-	-	50,000				
Spare parts and accessories	77,000	78,000	79,000	80,000	81,000	82,000	83,000	84,000	85,000	86,000	87,000	88,000	89,000	90,000
Mechanical Renewals (25 years)													6,740,000	
Electrical Renewals (25 years)													5,120,000	
Instrumentation Control Communications (15 yrs)													2,090,000	
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-				
	-	-	-	-	-	-	-	-	-	-				
Total renewal costs	$ 336,450	$ 340,044	$ 343,665	$ 397,311	$ 350,984	$ 354,684	$ 358,411	$ 362,165	$ 365,947	$ 419,756	$ 373,594	$ 377,460	$ 14,331,354	$ 385,278
Total acquisition costs	$ 336,450	$ 340,044	$ 343,665	$ 397,311	$ 350,984	$ 354,684	$ 358,411	$ 362,165	$ 365,947	$ 419,756	$ 373,594	$ 377,460	$ 14,331,354	$ 385,278
Scheduled/preventative maintenance	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823	45,823
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-				
Total maintenance costs	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823	$ 59,823
Staffing costs - Borefield and Transfer	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Utilities - GWTP	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200	115,200
Chemical Supplies and consumables	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-				
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-				
Support Costs	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500	47,500
Total operating costs	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200	$ 603,200
Total operating and maintenance costs	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023	$ 663,023
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	**$ 999,472**	**$ 1,003,067**	**$ 1,006,687**	**$ 1,060,334**	**$ 1,014,007**	**$ 1,017,707**	**$ 1,021,434**	**$ 1,025,188**	**$ 1,028,969**	**$ 1,082,779**	**$ 1,036,616**	**$ 1,040,482**	**$ 14,994,377**	**$ 1,048,300**

80 year whole-of-life cost	$ 143,763,787		
80 year NPV	$ 60,862,511	3%	40 year NPV
	$ 44,109,829	5%	
	$ 35,778,806	7%	

Life cycle cost analysis - Tyagarah Scheme 1 Option, 6.4 ML/d

Estimated costs (2020 $)		Source	Total 80 years	Year 1	2	3	4	5	6	7	8	9	10
Initial acquistion costs (non-recurring)													
Capital costs													
	Scheme investigation costs (2%)	Jacobs, 2020	$ 600,000	590,000	-	-	-	-	-	-	-	-	-
	Design and documentation costs (7%)	Jacobs, 2020	$ 2,087,000	-	2,055,000	-	-	-	-	-	-	-	-
	Environmental approval costs (4%)	Jacobs, 2020	$ 1,193,000	-	-	1,175,000	-	-	-	-	-	-	-
	Project management costs (2.5%)	Jacobs, 2020	$ 746,000	-	-	735,000	-	-	-	-	-	-	-
	Land acquistion costs	Jacobs, 2020	$ 7,020,000	-	-	6,800,000	-	-	-	-	-	-	-
	Construction costs (asset renewal life)		$ -	-	-	-		-	-	-	-	-	-
	Bores (50 years)	Jacobs, 2020	$ 1,015,000				845,000						
	Mechanical (25 years)	Jacobs, 2020	$ 9,940,000				9,720,000						
	Electrical (25 years)	Jacobs, 2020	$ 7,045,000				6,925,000						
	Civil including Pipelines (85 years)	Jacobs, 2020	$ 17,000,000				16,770,000						
	Instrumentation Control Communications (15 yrs	Jacobs, 2020	$ 3,013,000				2,990,000						
Integration costs	Integration costs (4%)	Jacobs, 2020	$ 1,193,000	-	-	1,175,000	-	-	-	-	-	-	-
	Existing supply network modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Existing facility modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Other capital costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
	Total initial capital costs		$ 50,852,000	$ 590,000	$ 2,055,000	$ 9,885,000	$ 37,250,000	$ -	$ -	$ -	$ -	$ -	$ -
Renewals			$ -										
	Repairs/unscheduled maintenance	Jacobs, 2020	$ 22,604,395	-	-	-	-	200,000	202,000	204,020	206,060	208,121	210,202
	Upgrades and refurbishments	Jacobs, 2020	$ 1,050,000	-	-	-	-	-	-	-	-	-	50,000
	Spare parts and accessories	Jacobs, 2020	$ 4,370,000	-	-	-	-	20,000	21,000	22,000	23,000	24,000	25,000
	Bores Renewals (50 years)	Jacobs, 2020	$ 1,015,000										
	Mechanical Renewals (25 years)	Jacobs, 2020	$ 29,600,000										
	Electrical Renewals (25 years)	Jacobs, 2020	$ 21,015,000										
	Civil including Pipelines Renewals (85 years)	Jacobs, 2020	$ 69,000										
	Instrumentation Control Communications (15 yrs	Jacobs, 2020	$ 14,950,000										
	Other repair costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Major filter renewals	Jacobs, 2020	$ 2,100,000	-	-	-	-	-	-	-	-	-	-
			$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
	Total renewal costs		$ 96,773,395	$ -	$ -	$ -	$ -	$ 220,000	$ 223,000	$ 226,020	$ 229,060	$ 232,121	$ 285,202
			$ -										
Total acquisition costs			$ 147,625,395	$ 590,000	$ 2,055,000	$ 9,885,000	$ 37,250,000	$ 220,000	$ 223,000	$ 226,020	$ 229,060	$ 232,121	$ 285,202
			$ -										
less Trade-in of item being replaced		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
Net acquisition costs			$ 147,625,395	$ 590,000	$ 2,055,000	$ 9,885,000	$ 37,250,000	$ 220,000	$ 223,000	$ 226,020	$ 229,060	$ 232,121	$ 285,202
			$ -										
Leasing costs			$ -										
Lease payments		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
Residual lease payments		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
Total leasing costs			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			$ -										
Ongoing operating and maintenance (recurring)			$ -										
Maintenance costs			$ -										
	Scheduled/preventative maintenance	Jacobs, 2020	$ 6,786,510	-	-	-	-	186,250	186,250	186,250	186,250	186,250	186,250
	Waste disposal	Jacobs, 2020	$ 2,456,000	-	-	-	-	14,000	14,000	14,000	14,000	14,000	14,000
	Other maintenance costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
	Total maintenance costs		$ 9,242,510	$ -	$ -	$ -	$ -	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250
			$ -										
Operating costs			$ -										
	Staffing costs - Borefield and Transfer	Jacobs, 2020	$ 9,120,000	-	-	-	-	120,000	120,000	120,000	120,000	120,000	120,000
	Staffing costs - GWTP	Jacobs, 2020	$ 9,880,000	-	-	-	-	130,000	130,000	130,000	130,000	130,000	130,000
	Utilities - Borefield and Transfer	Jacobs, 2020	$ 13,204,800					153,600	153,600	153,600	153,600	153,600	153,600
	Utilities - GWTP	Jacobs, 2020	$ 15,845,760					184,320	184,320	184,320	184,320	184,320	184,320
	Chemical Supplies and consumables GWTP	Jacobs, 2020	$ 17,606,400	-	-	-	-	204,800	204,800	204,800	204,800	204,800	204,800
	Training	Jacobs, 2020	$ 114,000	-	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500
	WQ monitoring	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Licences	Jacobs, 2020	$ 1,900,000	-	-	-	-	25,000	25,000	25,000	25,000	25,000	25,000
	Other operating costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Support Costs	Jacobs, 2020	$ 4,750,000	-	-	-	-	62,500	62,500	62,500	62,500	62,500	62,500
			$ -										
			$ -										
	Total operating costs		$ 72,420,960	$ -	$ -	$ -	$ -	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720
Total operating and maintenance costs			$ 81,663,470	$ -	$ -	$ -	$ -	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970
Disposal costs													
End-of-life disposal costs of the equipment		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
Total disposal costs			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Cost Over 80 years			$ 229,288,865										
Total Costs			$ 229,288,865	$ 590,000	$ 2,055,000	$ 9,885,000	$ 37,250,000	$ 1,301,970	$ 1,304,970	$ 1,307,990	$ 1,311,030	$ 1,314,091	$ 1,367,172

Item	11	12	13	14	15	16	17	18	19	20
Scheme investigation costs (2%)	-	-	-	-	-	-	-	-	10,000	-
Design and documentation costs (7%)	-	-	-	-	-	-	-	-	-	32,000
Environmental approval costs (4%)	-	-	-	-	-	-	-	-	-	-
Project management costs (2.5%)	-	-	-	-	-	-	-	-	-	-
Land acquistion costs	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Integration costs (4%)	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,000	$ 32,000
Repairs/unscheduled maintenance	212,304	214,427	216,571	218,737	220,924	223,134	225,365	227,619	229,895	232,194
Upgrades and refurbishments	-	-	-	-	-	50,000	-	-	-	-
Spare parts and accessories	26,000	27,000	28,000	29,000	30,000	31,000	32,000	33,000	34,000	35,000
Instrumentation Control Communications (15 yrs									2,990,000	
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-
Major filter renewals	-	-	300,000	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 238,304	$ 241,427	$ 544,571	$ 247,737	$ 250,924	$ 304,134	$ 257,365	$ 260,619	$ 3,253,895	$ 267,194
Total acquisition costs	$ 238,304	$ 241,427	$ 544,571	$ 247,737	$ 250,924	$ 304,134	$ 257,365	$ 260,619	$ 3,263,895	$ 299,194
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 238,304	$ 241,427	$ 544,571	$ 247,737	$ 250,924	$ 304,134	$ 257,365	$ 260,619	$ 3,263,895	$ 299,194
Lease payments	-	-	-	-	-	-	-	-	-	-
Residual lease payments	-	-	-	-	-	-	-	-	-	-
Total leasing costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Scheduled/preventative maintenance	186,250	186,250	186,250	186,250	186,250	186,250	186,250	186,250	186,250	186,250
Waste disposal	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250	$ 200,250
Staffing costs - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	153,600	153,600	153,600	153,600	153,600	153,600	153,600	153,600	153,600	153,600
Utilities - GWTP	184,320	184,320	184,320	184,320	184,320	184,320	184,320	184,320	184,320	184,320
Chemical Supplies and consumables GWTP	204,800	204,800	204,800	204,800	204,800	204,800	204,800	204,800	204,800	204,800
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-
Support Costs	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
Total operating costs	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720	$ 881,720
Total operating and maintenance costs	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970	$ 1,081,970
End-of-life disposal costs of the equipment	-	-	-	-	-	-	-	-	-	-
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,320,274	$ 1,323,397	$ 1,626,541	$ 1,329,707	$ 1,332,894	$ 1,386,104	$ 1,339,335	$ 1,342,589	$ 4,345,865	$ 1,381,164

Item	21	22	23	24	25	26	27	28	29	30
Scheme investigation costs (2%)	-	-		-	-	-	-	-	-	-
Design and documentation costs (7%)	-	-		-	-	-	-	-	-	-
Environmental approval costs (4%)	18,000	-		-	-	-	-	-	-	-
Project management costs (2.5%)	11,000	-		-	-	-	-	-	-	-
Land acquistion costs	220,000	-		-	-	-	-	-	-	-
Construction costs (asset renewal life)	-			-	-	-	-	-	-	-
Bores (50 years)		170,000								
Mechanical (25 years)		220,000								
Electrical (25 years)		120,000								
Civil including Pipelines (85 years)		230,000								
Instrumentation Control Communications (15 yrs		23,000								
Integration costs (4%)	18,000	-		-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ 267,000	$ 763,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	234,516	236,861	239,229	241,622	244,038	246,478	248,943	251,433	253,947	256,486
Upgrades and refurbishments	-	50,000	-	-	-	-	-	100,000	-	-
Spare parts and accessories	36,000	37,000	38,000	39,000	40,000	41,000	42,000	43,000	44,000	45,000
Mechanical Renewals (25 years)									9,720,000	
Electrical Renewals (25 years)									6,925,000	
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-
Major filter renewals	-	-	300,000	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 270,516	$ 323,861	$ 577,229	$ 280,622	$ 284,038	$ 287,478	$ 290,943	$ 394,433	$ 16,942,947	$ 301,486
Total acquisition costs	$ 537,516	$ 1,086,861	$ 577,229	$ 280,622	$ 284,038	$ 287,478	$ 290,943	$ 394,433	$ 16,942,947	$ 301,486
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 537,516	$ 1,086,861	$ 577,229	$ 280,622	$ 284,038	$ 287,478	$ 290,943	$ 394,433	$ 16,942,947	$ 301,486
Lease payments	-	-	-	-	-	-	-	-	-	-
Residual lease payments	-	-	-	-	-	-	-	-	-	-
Total leasing costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Scheduled/preventative maintenance	186,250	190,065	190,065	190,065	190,065	52,000	52,000	52,000	52,000	52,000
Waste disposal	14,000	14,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 200,250	$ 204,065	$ 228,065	$ 228,065	$ 228,065	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000
Staffing costs - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	153,600	153,600	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Utilities - GWTP	184,320	184,320	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000
Chemical Supplies and consumables GWTP	204,800	204,800	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-
Support Costs	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
Total operating costs	$ 881,720	$ 881,720	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000
Total operating and maintenance costs	$ 1,081,970	$ 1,085,785	$ 1,203,065	$ 1,203,065	$ 1,203,065	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000
End-of-life disposal costs of the equipment	-	-	-	-	-	-	-	-	-	-
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,619,486	$ 2,172,646	$ 1,780,294	$ 1,483,687	$ 1,487,103	$ 1,352,478	$ 1,355,943	$ 1,459,433	$ 18,007,947	$ 1,366,486

Item	31	32	33	34	35	36	37	38	39	40
Scheme investigation costs (2%)	-	-	-	-	-	-	-	-	-	-
Design and documentation costs (7%)	-	-	-	-	-	-	-	-	-	-
Environmental approval costs (4%)	-	-	-	-	-	-	-	-	-	-
Project management costs (2.5%)	-	-	-	-	-	-	-	-	-	-
Land acquistion costs	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Integration costs (4%)	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	259,051	261,642	264,258	266,901	269,570	272,265	274,988	277,738	280,515	283,321
Upgrades and refurbishments	-	-	-	100,000	-	-	-	-	-	100,000
Spare parts and accessories	46,000	47,000	48,000	49,000	50,000	51,000	52,000	53,000	54,000	55,000
Civil including Pipelines Renewals (85 years)							23,000			
Instrumentation Control Communications (15 yrs				2,990,000						
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-
Major filter renewals	-	-	300,000	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 305,051	$ 308,642	$ 612,258	$ 3,405,901	$ 319,570	$ 323,265	$ 349,988	$ 330,738	$ 334,515	$ 438,321
Total acquisition costs	$ 305,051	$ 308,642	$ 612,258	$ 3,405,901	$ 319,570	$ 323,265	$ 349,988	$ 330,738	$ 334,515	$ 438,321
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 305,051	$ 308,642	$ 612,258	$ 3,405,901	$ 319,570	$ 323,265	$ 349,988	$ 330,738	$ 334,515	$ 438,321
Lease payments	-	-	-	-	-	-	-	-	-	-
Residual lease payments	-	-	-	-	-	-	-	-	-	-
Total leasing costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Scheduled/preventative maintenance	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000
Waste disposal	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000
Staffing costs - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Utilities - GWTP	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000
Chemical Supplies and consumables GWTP	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-
Support Costs	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
Total operating costs	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000
Total operating and maintenance costs	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000
End-of-life disposal costs of the equipment	-	-	-	-	-	-	-	-	-	-
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,370,051	$ 1,373,642	$ 1,677,258	$ 4,470,901	$ 1,384,570	$ 1,388,265	$ 1,414,988	$ 1,395,738	$ 1,399,515	$ 1,503,321

80 year whole-of-life cost	$ 229,288,865		40 year NPV	$ 84,459,844	2060 yield 1,789 ML/a
80 year NPV	$ 102,557,614	3%		$ 69,888,062	NPV/ML yield $ 39,065
	$ 76,008,100	5%		$ 60,122,402	
	$ 62,323,819	7%			

Life cycle cost analysis - Tyagarah Scheme 1 Option, 6.4 ML/d

Estimated costs (2020 $)		Source	Total 80 years	41	42	43	44	45	46	47	48	49	50
Initial acquistion costs (non-recurring)													
Capital costs													
	Scheme investigation costs (2%)	Jacobs, 2020	$ 600,000	-	-	-	-	-	-	-	-	-	-
	Design and documentation costs (7%)	Jacobs, 2020	$ 2,087,000	-	-	-	-	-	-	-	-	-	-
	Environmental approval costs (4%)	Jacobs, 2020	$ 1,193,000	-	-	-	-	-	-	-	-	-	-
	Project management costs (2.5%)	Jacobs, 2020	$ 746,000	-	-	-	-	-	-	-	-	-	-
	Land acquistion costs	Jacobs, 2020	$ 7,020,000	-	-	-	-	-	-	-	-	-	-
	Construction costs (asset renewal life)		$ -	-	-	-	-	-	-	-	-	-	-
	Bores (50 years)	Jacobs, 2020	$ 1,015,000										
	Mechanical (25 years)	Jacobs, 2020	$ 9,940,000										
	Electrical (25 years)	Jacobs, 2020	$ 7,045,000										
	Civil including Pipelines (85 years)	Jacobs, 2020	$ 17,000,000										
	Instrumentation Control Communications (15 yrs	Jacobs, 2020	$ 3,013,000										
Integration costs	Integration costs (4%)	Jacobs, 2020	$ 1,193,000	-	-	-	-	-	-	-	-	-	-
	Existing supply network modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Existing facility modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Other capital costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
	Total initial capital costs		$ 50,852,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals			$ -										
	Repairs/unscheduled maintenance	Jacobs, 2020	$ 22,604,395	286,154	289,015	291,905	294,825	297,773	300,750	303,758	306,796	309,864	312,962
	Upgrades and refurbishments	Jacobs, 2020	$ 1,050,000	-	-	-	-	-	100,000	-	-	-	-
	Spare parts and accessories	Jacobs, 2020	$ 4,370,000	56,000	57,000	58,000	59,000	60,000	61,000	62,000	63,000	64,000	65,000
	Bores Renewals (50 years)	Jacobs, 2020	$ 1,015,000										
	Mechanical Renewals (25 years)	Jacobs, 2020	$ 29,600,000							220,000			
	Electrical Renewals (25 years)	Jacobs, 2020	$ 21,015,000							120,000			
	Civil including Pipelines Renewals (85 years)	Jacobs, 2020	$ 69,000										
	Instrumentation Control Communications (15 yrs	Jacobs, 2020	$ 14,950,000									2,990,000	
	Other repair costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Major filter renewals	Jacobs, 2020	$ 2,100,000		-	300,000	-	-	-	-	-	-	-
			$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
	Total renewal costs		$ 96,773,395	$ 342,154	$ 346,015	$ 649,905	$ 353,825	$ 357,773	$ 461,750	$ 705,758	$ 369,796	$ 3,363,864	$ 377,962
			$ -										
Total acquisition costs			$ 147,625,395	$ 342,154	$ 346,015	$ 649,905	$ 353,825	$ 357,773	$ 461,750	$ 705,758	$ 369,796	$ 3,363,864	$ 377,962
			$ -										
less Trade-in of item being replaced		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
Net acquisition costs			$ 147,625,395	$ 342,154	$ 346,015	$ 649,905	$ 353,825	$ 357,773	$ 461,750	$ 705,758	$ 369,796	$ 3,363,864	$ 377,962
			$ -										
Leasing costs			$ -										
Lease payments		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
Residual lease payments		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
Total leasing costs			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			$ -										
Ongoing operating and maintenance (recurring)			$ -										
Maintenance costs			$ -										
	Scheduled/preventative maintenance	Jacobs, 2020	$ 6,786,510	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000
	Waste disposal	Jacobs, 2020	$ 2,456,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000
	Other maintenance costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
			$ -										
	Total maintenance costs		$ 9,242,510	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000
			$ -										
Operating costs			$ -										
	Staffing costs - Borefield and Transfer	Jacobs, 2020	$ 9,120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
	Staffing costs - GWTP	Jacobs, 2020	$ 9,880,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
	Utilities - Borefield and Transfer	Jacobs, 2020	$ 13,204,800	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
	Utilities - GWTP	Jacobs, 2020	$ 15,845,760	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000
	Chemical Supplies and consumables GWTP	Jacobs, 2020	$ 17,606,400	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
	Training	Jacobs, 2020	$ 114,000	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
	WQ monitoring	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Licences	Jacobs, 2020	$ 1,900,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
	Other operating costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
	Support Costs	Jacobs, 2020	$ 4,750,000	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
			$ -										
			$ -										
	Total operating costs		$ 72,420,960	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000
Total operating and maintenance costs			$ 81,663,470	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000
Disposal costs													
End-of-life disposal costs of the equipment		Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-
Total disposal costs			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Cost Over 80 years			$ 229,288,865										
Total Costs			$ 229,288,865	$ 1,407,154	$ 1,411,015	$ 1,714,905	$ 1,418,825	$ 1,422,773	$ 1,526,750	$ 1,770,758	$ 1,434,796	$ 4,428,864	$ 1,442,962

Item	51	52	53	54	55	56	57	58	59	60
Scheme investigation costs (2%)	-	-	-	-	-	-	-	-	-	-
Design and documentation costs (7%)	-	-	-	-	-	-	-	-	-	-
Environmental approval costs (4%)	-	-	-	-	-	-	-	-	-	-
Project management costs (2.5%)	-	-	-	-	-	-	-	-	-	-
Land acquistion costs	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Integration costs (4%)	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	316,092	319,253	322,445	325,670	328,926	332,216	335,538	338,893	342,282	345,705
Upgrades and refurbishments	-	100,000	-	-	-	-	-	100,000	-	-
Spare parts and accessories	66,000	67,000	68,000	69,000	70,000	71,000	72,000	73,000	74,000	75,000
Bores Renewals (50 years)				845,000						
Mechanical Renewals (25 years)				9,720,000						
Electrical Renewals (25 years)				6,925,000						
Civil including Pipelines Renewals (85 years)		23,000								
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-
Major filter renewals		-	300,000	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 382,092	$ 509,253	$ 690,445	$ 17,884,670	$ 398,926	$ 403,216	$ 407,538	$ 511,893	$ 416,282	$ 420,705
Total acquisition costs	$ 382,092	$ 509,253	$ 690,445	$ 17,884,670	$ 398,926	$ 403,216	$ 407,538	$ 511,893	$ 416,282	$ 420,705
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 382,092	$ 509,253	$ 690,445	$ 17,884,670	$ 398,926	$ 403,216	$ 407,538	$ 511,893	$ 416,282	$ 420,705
Lease payments	-	-	-	-	-	-	-	-	-	-
Residual lease payments	-	-	-	-	-	-	-	-	-	-
Total leasing costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Scheduled/preventative maintenance	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000
Waste disposal	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000
Staffing costs - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Utilities - GWTP	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000
Chemical Supplies and consumables GWTP	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-
Support Costs	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
Total operating costs	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000
Total operating and maintenance costs	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000
End-of-life disposal costs of the equipment	-	-	-	-	-	-	-	-	-	-
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,447,092	$ 1,574,253	$ 1,755,445	$ 18,949,670	$ 1,463,926	$ 1,468,216	$ 1,472,538	$ 1,576,893	$ 1,481,282	$ 1,485,705

Item	61	62	63	64	65	66	67	68	69	70
Scheme investigation costs (2%)	-	-	-	-	-	-	-	-	-	-
Design and documentation costs (7%)	-	-	-	-	-	-	-	-	-	-
Environmental approval costs (4%)	-	-	-	-	-	-	-	-	-	-
Project management costs (2.5%)	-	-	-	-	-	-	-	-	-	-
Land acquistion costs	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Integration costs (4%)	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	349,162	352,654	356,180	359,742	363,339	366,973	370,642	374,349	378,092	381,873
Upgrades and refurbishments	-	-	-	100,000	-	-	-	-	-	100,000
Spare parts and accessories	76,000	77,000	78,000	79,000	80,000	81,000	82,000	83,000	84,000	85,000
Civil including Pipelines Renewals (85 years)							23,000			
Instrumentation Control Communications (15 yrs				2,990,000						
Other repair costs (specify)	-	-	-	-	-	-	-	-	-	-
Major filter renewals	-	-	300,000	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total renewal costs	$ 425,162	$ 429,654	$ 734,180	$ 3,528,742	$ 443,339	$ 447,973	$ 475,642	$ 457,349	$ 462,092	$ 566,873
Total acquisition costs	$ 425,162	$ 429,654	$ 734,180	$ 3,528,742	$ 443,339	$ 447,973	$ 475,642	$ 457,349	$ 462,092	$ 566,873
Trade-in of item being replaced	-	-	-	-	-	-	-	-	-	-
Net acquisition costs	$ 425,162	$ 429,654	$ 734,180	$ 3,528,742	$ 443,339	$ 447,973	$ 475,642	$ 457,349	$ 462,092	$ 566,873
Lease payments	-	-	-	-	-	-	-	-	-	-
Residual lease payments	-	-	-	-	-	-	-	-	-	-
Total leasing costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Scheduled/preventative maintenance	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000
Waste disposal	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000
Other maintenance costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total maintenance costs	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000
Staffing costs - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Utilities - GWTP	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000
Chemical Supplies and consumables GWTP	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-	-	-	-	-
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-	-	-	-	-
Support Costs	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
Total operating costs	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000
Total operating and maintenance costs	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000
End-of-life disposal costs of the equipment	-	-	-	-	-	-	-	-	-	-
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,490,162	$ 1,494,654	$ 1,799,180	$ 4,593,742	$ 1,508,339	$ 1,512,973	$ 1,540,642	$ 1,522,349	$ 1,527,092	$ 1,631,873

Item	71	72	73	74	75	76	77	78	79	80
Scheme investigation costs (2%)	-	-	-	-	-	-	-	-	-	-
Design and documentation costs (7%)	-	-	-	-	-	-	-	-	-	-
Environmental approval costs (4%)	-	-	-	-	-	-	-	-	-	-
Project management costs (2.5%)	-	-	-	-	-	-	-	-	-	-
Land acquistion costs	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)	-	-	-	-	-	-	-	-	-	-
Integration costs (4%)	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Repairs/unscheduled maintenance	385,692	389,549	393,444	397,379	401,353	405,366	409,420	413,514	417,649	421,826
Upgrades and refurbishments	-	-	-	-	-	100,000	-	-	-	-
Spare parts and accessories	86,000	87,000	88,000	89,000	90,000	91,000	92,000	93,000	94,000	95,000
Bores Renewals (50 years)		170,000								
Mechanical Renewals (25 years)		220,000						9,720,000		
Electrical Renewals (25 years)		120,000						6,925,000		
Instrumentation Control Communications (15 yrs									2,990,000	
Other repair costs (specify)	-	-	-	-	-	-				
Major filter renewals		-	300,000	-	-	-	-	-	-	
	-	-	-	-	-	-				
Total renewal costs	$ 471,692	$ 986,549	$ 781,444	$ 486,379	$ 491,353	$ 596,366	$ 501,420	$ 17,151,514	$ 3,501,649	$ 516,826
Total acquisition costs	$ 471,692	$ 986,549	$ 781,444	$ 486,379	$ 491,353	$ 596,366	$ 501,420	$ 17,151,514	$ 3,501,649	$ 516,826
Trade-in of item being replaced	-	-	-	-	-	-				
Net acquisition costs	$ 471,692	$ 986,549	$ 781,444	$ 486,379	$ 491,353	$ 596,366	$ 501,420	$ 17,151,514	$ 3,501,649	$ 516,826
Lease payments	-	-	-	-	-	-	-	-	-	-
Residual lease payments	-	-	-	-	-	-	-	-	-	-
Total leasing costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Scheduled/preventative maintenance	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000
Waste disposal	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000	38,000
Other maintenance costs (specify)	-	-	-	-	-	-				
	-	-	-	-	-	-				
Total maintenance costs	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000	$ 90,000
Staffing costs - Borefield and Transfer	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Staffing costs - GWTP	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
Utilities - Borefield and Transfer	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Utilities - GWTP	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000
Chemical Supplies and consumables GWTP	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Training	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	-	-	-	-	-	-				
Licences	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	-	-	-	-	-	-				
Support Costs	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
Total operating costs	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000	$ 975,000
Total operating and maintenance costs	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000
End-of-life disposal costs of the equipment	-	-	-	-	-	-				
Total disposal costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs	$ 1,536,692	$ 2,051,549	$ 1,846,444	$ 1,551,379	$ 1,556,353	$ 1,661,366	$ 1,566,420	$ 18,216,514	$ 4,566,649	$ 1,581,826

80 year whole-of-life cost	$ 229,288,865	
80 year NPV	$ 102,557,614	3%
	$ 76,008,100	5%
	$ 62,323,819	7%

Life cycle cost analysis - Tyagarah Scheme 2 Option, expansion to 12.5 ML/d

Estimated costs (2020 $)	Source	Total 80 years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Initial acquistion costs (non-recurring)																																										
Capital costs																																										
Scheme investigation costs (2%)	Jacobs, 2020	$ 331,000	315,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16,000						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Design and documentation costs (7%)	Jacobs, 2020	$ 1,171,000	-	1,115,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,000					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environmental approval costs (4%)	Jacobs, 2020	$ 667,000	-	-	635,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		32,000				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project management costs (2.5%)	Jacobs, 2020	$ 420,000	-	-	400,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		20,000				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Land acquistion costs	Jacobs, 2020	$ 690,000	-	-	465,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		225,000				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction costs (asset renewal life)		$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bores (50 years)	Jacobs, 2020	$ 760,000	-	-	-	425,000																		335,000																		
Mechanical (25 years)	Jacobs, 2020	$ 6,877,500	-	-	-	6,437,500																		440,000																		
Electrical (25 years)	Jacobs, 2020	$ 4,402,500	-	-	-	4,162,500																		240,000																		
Civil including Pipelines (85 years)	Jacobs, 2020	$ 12,412,500	-	-	-	12,162,500																		250,000																		
Instrumentation Control Communications (15 yrs)	Jacobs, 2020	$ 2,063,750	-	-	-	2,018,750																		45,000																		
Integration costs — Integration costs (4%)	Jacobs, 2020	$ 667,000	-	-	635,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		32,000				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing supply network modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Existing facility modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other capital costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		$ -																																								
Total initial capital costs		$ 30,462,250	$ 315,000	$ 1,115,000	$ 2,135,000	$ 25,206,250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,000	$ 56,000	$ 309,000	$ 1,310,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals		$ -																																								
Repairs/unscheduled maintenance	Jacobs, 2020	$ 28,255,494	-	-	-	-	250,000	252,500	255,025	257,575	260,151	262,753	265,380	268,034	270,714	273,421	276,156	278,917	281,706	284,523	287,369	290,242	293,145	296,076	299,037	302,027	305,048	308,098	311,179	314,291	317,434	320,608	323,814	327,052	330,323	333,626	336,962	340,332	343,735	347,173	350,644	354,151
Upgrades and refurbishments	Jacobs, 2020	$ 1,050,000	-	-	-	-		-	-	-	-	50,000	-	-	-	-	-	50,000	-	-	-	-	-	50,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000
Spare parts and accessories	Jacobs, 2020	$ 5,130,000	-	-	-	-	30,000	31,000	32,000	33,000	34,000	35,000	36,000	37,000	38,000	39,000	40,000	41,000	42,000	43,000	44,000	45,000	46,000	47,000	48,000	49,000	50,000	51,000	52,000	53,000	54,000	55,000	56,000	57,000	58,000	59,000	60,000	61,000	62,000	63,000	64,000	65,000
Bores Renewals (50 years)	Jacobs, 2020	$ 1,520,000																																								
Mechanical Renewals (25 years)	Jacobs, 2020	$ 45,490,000																													14,870,000											
Electrical Renewals (25 years)	Jacobs, 2020	$ 20,990,000																													10,255,000											
Civil including Pipelines Renewals (85 years)	Jacobs, 2020	$ -																																								
Instrumentation Control Communications (15 yrs)	Jacobs, 2020	$ 23,160,000																			4,605,000															4,605,000			45,000			
Other repair costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major filter renewals	Jacobs, 2020	$ 2,100,000	-	-		-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-
		$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		$ -																																								
Total renewal costs		$ 127,695,494	$ -	$ -	$ -	$ -	$ 280,000	$ 283,500	$ 287,025	$ 290,575	$ 294,151	$ 347,753	$ 301,380	$ 305,034	$ 608,714	$ 312,421	$ 316,156	$ 369,917	$ 323,706	$ 327,523	$ 4,936,369	$ 335,242	$ 339,145	$ 393,076	$ 647,037	$ 351,027	$ 355,048	$ 359,098	$ 363,179	$ 467,291	$ 25,496,434	$ 375,608	$ 379,814	$ 384,052	$ 688,323	$ 5,097,626	$ 396,962	$ 401,332	$ 450,735	$ 410,173	$ 414,644	$ 519,151
		$ -																																								
Total acquisition costs		$ 158,157,744	$ 315,000	$ 1,115,000	$ 2,135,000	$ 25,206,250	$ 280,000	$ 283,500	$ 287,025	$ 290,575	$ 294,151	$ 347,753	$ 301,380	$ 305,034	$ 608,714	$ 312,421	$ 316,156	$ 369,917	$ 323,706	$ 327,523	$ 4,952,369	$ 391,242	$ 648,145	$ 1,703,076	$ 647,037	$ 351,027	$ 355,048	$ 359,098	$ 363,179	$ 467,291	$ 25,496,434	$ 375,608	$ 379,814	$ 384,052	$ 688,323	$ 5,097,626	$ 396,962	$ 401,332	$ 450,735	$ 410,173	$ 414,644	$ 519,151
		$ -																																								
Ongoing operating and maintenance (recurring)		$ -																																								
Maintenance costs		$ -																																								
Scheduled/preventative maintenance	Jacobs, 2020	$ 9,958,275	-	-	-	-	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	126,031	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581
Waste disposal	Jacobs, 2020	$ 1,064,000	-	-	-	-	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		$ -																																								
Total maintenance costs		$ 11,022,275	$ -	$ -	$ -	$ -	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 140,031	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581
		$ -																																								
Operating costs		$ -																																								
Staffing costs - Borefield and Transfer	Jacobs, 2020	$ 11,400,000	-	-	-	-	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Staffing costs - GWTP	Jacobs, 2020	$ 11,400,000	-	-	-	-	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Utilities - Borefield and Transfer	Jacobs, 2020	$ 22,065,600					259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	259,200	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Utilities - GWTP	Jacobs, 2020	$ 26,478,720					311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	311,040	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000
Chemical Supplies and consumables GWTP	Jacobs, 2020	$ 29,420,800	-	-	-	-	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	345,600	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Training	Jacobs, 2020	$ 114,000	-	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Licences	Jacobs, 2020	$ 1,900,000	-	-	-	-	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	Jacobs, 2020	$ 5,700,000	-	-	-	-	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Total operating costs		**$ 108,479,120**	$ -	$ -	$ -	$ -	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,317,340	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500
Total operating and maintenance costs		**$ 119,501,395**	$ -	$ -	$ -	$ -	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,457,371	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081
Total Costs		**$ 277,659,139**	**$ 315,000**	**$ 1,115,000**	**$ 2,135,000**	**$ 25,206,250**	**$ 1,737,371**	**$ 1,740,871**	**$ 1,744,396**	**$ 1,747,947**	**$ 1,751,522**	**$ 1,805,124**	**$ 1,758,751**	**$ 1,762,405**	**$ 2,066,085**	**$ 1,769,793**	**$ 1,773,527**	**$ 1,827,288**	**$ 1,781,078**	**$ 1,784,895**	**$ 6,409,740**	**$ 1,848,613**	**$ 2,105,516**	**$ 3,160,447**	**$ 2,255,118**	**$ 1,959,108**	**$ 1,963,129**	**$ 1,967,179**	**$ 1,971,260**	**$ 2,075,372**	**$ 27,104,515**	**$ 1,983,689**	**$ 1,987,895**	**$ 1,992,133**	**$ 2,296,404**	**$ 6,705,707**	**$ 2,005,043**	**$ 2,009,413**	**$ 2,058,816**	**$ 2,018,254**	**$ 2,022,725**	**$ 2,127,232**

80 year whole-of-life cost	$ 277,659,139		40 year NPV	$ 80,437,715	2060 yield	3,448 ML/a
80 year NPV	$ 105,760,458	3%		$ 61,558,652	NPV/ML yield	$ 38,123
	$ 70,231,337	5%		$ 49,463,064		
	$ 52,611,472	7%				

Life cycle cost analysis - Tyagarah Scheme 2 Option, expansion to 12.5 ML/d

Estimated costs (2020 $)	Source	Total 80 years	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Initial acquistion costs (non-recurring)																																										
Capital costs																																										
Scheme investigation costs (2%)	Jacobs, 2020	$ 331,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Design and documentation costs (7%)	Jacobs, 2020	$ 1,171,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Environmental approval costs (4%)	Jacobs, 2020	$ 667,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Project management costs (2.5%)	Jacobs, 2020	$ 420,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Land acquistion costs	Jacobs, 2020	$ 690,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Construction costs (asset renewal life)		$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Bores (50 years)	Jacobs, 2020	$ 760,000																																								
Mechanical (25 years)	Jacobs, 2020	$ 6,877,500																																								
Electrical (25 years)	Jacobs, 2020	$ 4,402,500																																								
Civil including Pipelines (85 years)	Jacobs, 2020	$ 12,412,500																																								
Instrumentation Control Communications (15 yrs)	Jacobs, 2020	$ 2,063,750																																								
Integration costs — Integration costs (4%)	Jacobs, 2020	$ 667,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Existing supply network modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Existing facility modifications	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Other capital costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
		$ -																																								
Total initial capital costs		$ 30,462,250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Renewals		$ -																																								
Repairs/unscheduled maintenance	Jacobs, 2020	$ 28,255,494	357,692	361,269	364,882	368,531	372,216	375,938	379,697	383,494	387,329	391,203	395,115	399,066	403,057	407,087	411,158	415,270	419,422	423,616	427,853	432,131	436,452	440,817	445,225	449,677	454,174	458,716	463,303	467,936	472,615	477,342	482,115	486,936	491,806	496,724	501,691	506,708	511,775	516,893	522,062	527,282
Upgrades and refurbishments	Jacobs, 2020	$ 1,050,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-
Spare parts and accessories	Jacobs, 2020	$ 5,130,000	66,000	67,000	68,000	69,000	70,000	71,000	72,000	73,000	74,000	75,000	76,000	77,000	78,000	79,000	80,000	81,000	82,000	83,000	84,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000	101,000	102,000	103,000	104,000	105,000
Bores Renewals (50 years)	Jacobs, 2020	$ 1,520,000														1,185,000																		335,000								
Mechanical Renewals (25 years)	Jacobs, 2020	$ 45,490,000							440,000							14,870,000																		440,000							14,870,000	
Electrical Renewals (25 years)	Jacobs, 2020	$ 20,990,000							240,000							10,255,000																		240,000								
Civil including Pipelines Renewals (85 years)	Jacobs, 2020	$ -																																								
Instrumentation Control Communications (15 yrs)	Jacobs, 2020	$ 23,160,000									4,605,000			45,000												4,605,000			45,000												4,605,000	
Other repair costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Major filter renewals	Jacobs, 2020	$ 2,100,000		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	
		$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
		$ -																																								
Total renewal costs		$ 127,695,494	$ 423,692	$ 428,269	$ 732,882	$ 437,531	$ 442,216	$ 546,938	$ 1,131,697	$ 456,494	$ 5,066,329	$ 466,203	$ 471,115	$ 621,066	$ 781,057	$ 26,796,087	$ 491,158	$ 496,270	$ 501,422	$ 606,616	$ 511,853	$ 517,131	$ 522,452	$ 527,817	$ 833,225	$ 5,243,677	$ 544,174	$ 549,716	$ 600,303	$ 560,936	$ 566,615	$ 672,342	$ 578,115	$ 1,598,936	$ 889,806	$ 595,724	$ 601,691	$ 707,708	$ 613,775	$ 619,893	$ 20,101,062	$ 632,282
		$ -																																								
Total acquisition costs		$ 158,157,744	$ 423,692	$ 428,269	$ 732,882	$ 437,531	$ 442,216	$ 546,938	$ 1,131,697	$ 456,494	$ 5,066,329	$ 466,203	$ 471,115	$ 621,066	$ 781,057	$ 26,796,087	$ 491,158	$ 496,270	$ 501,422	$ 606,616	$ 511,853	$ 517,131	$ 522,452	$ 527,817	$ 833,225	$ 5,243,677	$ 544,174	$ 549,716	$ 600,303	$ 560,936	$ 566,615	$ 672,342	$ 578,115	$ 1,598,936	$ 889,806	$ 595,724	$ 601,691	$ 707,708	$ 613,775	$ 619,893	$ 20,101,062	$ 632,282
		$ -																																								
Ongoing operating and maintenance (recurring)		$ -																																								
Maintenance costs		$ -																																								
Scheduled/preventative maintenance	Jacobs, 2020	$ 9,958,275	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581	132,581
Waste disposal	Jacobs, 2020	$ 1,064,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
Other maintenance costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
		$ -																																								
Total maintenance costs		$ 11,022,275	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581	$ 146,581
		$ -																																								
Operating costs		$ -																																								
Staffing costs - Borefield and Transfer	Jacobs, 2020	$ 11,400,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Staffing costs - GWTP	Jacobs, 2020	$ 11,400,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Utilities - Borefield and Transfer	Jacobs, 2020	$ 22,065,600	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Utilities - GWTP	Jacobs, 2020	$ 26,478,720	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000
Chemical Supplies and consumables GWTP	Jacobs, 2020	$ 29,420,800	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Training	Jacobs, 2020	$ 114,000	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
WQ monitoring	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Licences	Jacobs, 2020	$ 1,900,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Other operating costs (specify)	Jacobs, 2020	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Support Costs	Jacobs, 2020	$ 5,700,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Total operating costs		**$ 108,479,120**	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500	$ 1,461,500
Total operating and maintenance costs		**$ 119,501,395**	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081	$ 1,608,081
Total Costs		**$ 277,659,139**	**$ 2,031,773**	**$ 2,036,350**	**$ 2,340,963**	**$ 2,045,612**	**$ 2,050,297**	**$ 2,155,019**	**$ 2,739,779**	**$ 2,064,576**	**$ 6,674,411**	**$ 2,074,284**	**$ 2,079,196**	**$ 2,229,147**	**$ 2,389,138**	**$ 28,404,168**	**$ 2,099,239**	**$ 2,104,351**	**$ 2,109,503**	**$ 2,214,698**	**$ 2,119,934**	**$ 2,125,212**	**$ 2,130,534**	**$ 2,135,898**	**$ 2,441,306**	**$ 6,851,759**	**$ 2,152,255**	**$ 2,157,797**	**$ 2,208,384**	**$ 2,169,017**	**$ 2,174,697**	**$ 2,280,423**	**$ 2,186,196**	**$ 3,207,017**	**$ 2,497,887**	**$ 2,203,805**	**$ 2,209,772**	**$ 2,315,789**	**$ 2,221,856**	**$ 2,227,974**	**$ 21,709,143**	**$ 2,240,363**

80 year whole-of-life cost	$ 277,659,139		40 year NPV
80 year NPV	$ 105,760,458	3%	
	$ 70,231,337	5%	
	$ 52,611,472	7%	

Life cycle cost analysis - Newrybar Option

Estimated costs (2020 $)		Source	Total 80 years	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Initial acquistion costs (non-recurring)																																											
Capital costs																																											
	Scheme investigation costs (2%)	Jacobs (2020)	$ 730,000	730,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Design and documentation costs (7%)	Jacobs (2020)	$ 2,560,000	-	2,560,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Environmental approval costs (4%)	Jacobs (2020)	$ 1,460,000	-	-	1,460,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Project management costs (2.5%)	Jacobs (2020)	$ 915,000	-	-	915,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Land acquistion costs	Jacobs (2020)	$ 8,870,000	-	-	8,870,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Construction costs (asset renewal life)	Jacobs (2020)	$ -	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bores (50 years)	Jacobs (2020)	$ 1,320,000				1,320,000																																				
	Mechanical (25 years)	Jacobs (2020)	$ 9,250,000				9,250,000																																				
	Electrical (25 years)	Jacobs (2020)	$ 5,910,000				5,910,000																																				
	Civil including Pipelines (85 years)	Jacobs (2020)	$ 28,120,000				28,120,000																																				
	Instrumentation Control Communications (15 yrs)	Jacobs (2020)	$ 2,560,000				2,560,000																																				
Integration costs	Integration costs (4%)	Jacobs (2020)	$ 1,460,000	-	-	1,460,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Existing supply network modifications	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Existing facility modifications	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other capital costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total initial capital costs		**$ 63,155,000**	$ 730,000	$ 2,560,000	$ 12,705,000	$ 47,160,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals																																											
	Repairs/unscheduled maintenance	Jacobs (2020)	$ 22,604,395	-	-	-	-	200,000	202,000	204,020	206,060	208,121	210,202	212,304	214,427	216,571	218,737	220,924	223,134	225,365	227,619	229,895	232,194	234,516	236,861	239,229	241,622	244,038	246,478	248,943	251,433	253,947	256,486	259,051	261,642	264,258	266,901	269,570	272,265	274,988	277,738	280,515	283,321
	Upgrades and refurbishments	Jacobs (2020)	$ 1,200,000	-	-	-	-	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000
	Spare parts and accessories	Jacobs (2020)	$ 4,750,000	-	-	-	-	25,000	26,000	27,000	28,000	29,000	30,000	31,000	32,000	33,000	34,000	35,000	36,000	37,000	38,000	39,000	40,000	41,000	42,000	43,000	44,000	45,000	46,000	47,000	48,000	49,000	50,000	51,000	52,000	53,000	54,000	55,000	56,000	57,000	58,000	59,000	60,000
	Bores Renewals (50 years)	Jacobs (2020)	$ 1,320,000																																								
	Mechanical Renewals (25 years)	Jacobs (2020)	$ 18,500,000																													9,250,000											
	Electrical Renewals (25 years)	Jacobs (2020)	$ 11,820,000																													5,910,000											
	Civil including Pipelines Renewals (85 years)	Jacobs (2020)	$ -																																								
	Instrumentation Control Communications (15 yrs)	Jacobs (2020)	$ 10,240,000																			2,560,000															2,560,000						
	Other repair costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	RO membranes (10 years)	Jacobs (2020)	$ 7,000,000	-	-	-	-	-	-	-	-	-	-	-		-	-	1,000,000	-	-	-	-		-	-	-		1,000,000										1,000,000					
	Major filter renewals	Jacobs, 2020	$ 2,100,000	-	-		-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-
	Total renewal costs		**$ 79,534,395**	$ -	$ -	$ -	$ -	$ 225,000	$ 228,000	$ 231,020	$ 234,060	$ 237,121	$ 340,202	$ 243,304	$ 246,427	$ 549,571	$ 252,737	$ 1,255,924	$ 359,134	$ 262,365	$ 265,619	$ 2,828,895	$ 272,194	$ 275,516	$ 378,861	$ 582,229	$ 285,622	$ 1,289,038	$ 292,478	$ 295,943	$ 399,433	$ 15,462,947	$ 306,486	$ 310,051	$ 313,642	$ 617,258	$ 2,980,901	$ 1,324,570	$ 328,265	$ 331,988	$ 335,738	$ 339,515	$ 443,321
Total acquisition costs			**$ 142,689,395**	$ 730,000	$ 2,560,000	$ 12,705,000	$ 47,160,000	$ 225,000	$ 228,000	$ 231,020	$ 234,060	$ 237,121	$ 340,202	$ 243,304	$ 246,427	$ 549,571	$ 252,737	$ 1,255,924	$ 359,134	$ 262,365	$ 265,619	$ 2,828,895	$ 272,194	$ 275,516	$ 378,861	$ 582,229	$ 285,622	$ 1,289,038	$ 292,478	$ 295,943	$ 399,433	$ 15,462,947	$ 306,486	$ 310,051	$ 313,642	$ 617,258	$ 2,980,901	$ 1,324,570	$ 328,265	$ 331,988	$ 335,738	$ 339,515	$ 443,321
Total leasing costs			**$ -**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ongoing Operating and Maintenance (recurring)																																											
Maintenance costs																																											
	Scheduled/preventative maintenance	Jacobs (2020)	$ 17,920,800	-	-	-	-	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800
	Waste disposal	Jacobs (2020)	$ 1,064,000	-	-	-	-	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
	Other maintenance costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total maintenance costs		**$ 18,984,800**	$ -	$ -	$ -	$ -	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800
Operating costs																																											
	Staffing costs - Borefield and Transfer	Jacobs (2020)	$ 9,120,000	-	-	-	-	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
	Staffing costs - GWTP	Jacobs (2020)	$ 9,880,000					130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
	Utilities - Borefield and Transfer	Jacobs (2020)	$ 13,132,800	-	-	-	-	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800
	Utilities - GWTP	Jacobs (2020)	$ 52,531,200					691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200
	Chemical Supplies and consumables	Jacobs (2020)	$ 21,888,000	-	-	-	-	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000
	Training	Jacobs (2020)	$ 114,000	-	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
	WQ monitoring	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Licences	Jacobs (2020)	$ 1,900,000	-	-	-	-	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
	Other operating costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Support Costs	Jacobs (2020)	$ 4,750,000	-	-	-	-	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
	Total operating costs		**$ 113,316,000**	$ -	$ -	$ -	$ -	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000
Total operating and maintenance costs			**$ 132,300,800**	$ -	$ -	$ -	$ -	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800
Total Costs			**$ 274,990,195**	**$ 730,000**	**$ 2,560,000**	**$ 12,705,000**	**$ 47,160,000**	**$ 1,965,800**	**$ 1,968,800**	**$ 1,971,820**	**$ 1,974,860**	**$ 1,977,921**	**$ 2,081,002**	**$ 1,984,104**	**$ 1,987,227**	**$ 2,290,371**	**$ 1,993,537**	**$ 2,996,724**	**$ 2,099,934**	**$ 2,003,165**	**$ 2,006,419**	**$ 4,569,695**	**$ 2,012,994**	**$ 2,016,316**	**$ 2,119,661**	**$ 2,323,029**	**$ 2,026,422**	**$ 3,029,838**	**$ 2,033,278**	**$ 2,036,743**	**$ 2,140,233**	**$ 17,203,747**	**$ 2,047,286**	**$ 2,050,851**	**$ 2,054,442**	**$ 2,358,058**	**$ 4,721,701**	**$ 3,065,370**	**$ 2,069,065**	**$ 2,072,788**	**$ 2,076,538**	**$ 2,080,315**	**$ 2,184,121**

80 year whole-of-life cost	**$ 274,990,195**		40 year NPV	############		2060 yield	1,833	ML/a
80 year NPV	**$ 131,213,859**	3%		**$ 91,091,988**		NPV/ML yield	$ 49,696	
	$ 98,566,607	5%		**$ 78,382,136**				
	$ 81,151,532	7%						

Life cycle cost analysis - Newrybar Option

Estimated costs (2020 $)		Source	Total 80 years	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Initial acquistion costs (non-recurring)																																											
Capital costs																																											
	Scheme investigation costs (2%)	Jacobs (2020)	$ 730,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Design and documentation costs (7%)	Jacobs (2020)	$ 2,560,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Environmental approval costs (4%)	Jacobs (2020)	$ 1,460,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Project management costs (2.5%)	Jacobs (2020)	$ 915,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Land acquistion costs	Jacobs (2020)	$ 8,870,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Construction costs (asset renewal life)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Bores (50 years)	Jacobs (2020)	$ 1,320,000																																								
	Mechanical (25 years)	Jacobs (2020)	$ 9,250,000																																								
	Electrical (25 years)	Jacobs (2020)	$ 5,910,000																																								
	Civil including Pipelines (85 years)	Jacobs (2020)	$ 28,120,000																																								
	Instrumentation Control Communications (15 yrs)	Jacobs (2020)	$ 2,560,000																																								
Integration costs	Integration costs (4%)	Jacobs (2020)	$ 1,460,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Existing supply network modifications	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Existing facility modifications	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Other capital costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Total initial capital costs		**$ 63,155,000**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Renewals																																											
	Repairs/unscheduled maintenance	Jacobs (2020)	$ 22,604,395	286,154	289,015	291,905	294,825	297,773	300,750	303,758	306,796	309,864	312,962	316,092	319,253	322,445	325,670	328,926	332,216	335,538	338,893	342,282	345,705	349,162	352,654	356,180	359,742	363,339	366,973	370,642	374,349	378,092	381,873	385,692	389,549	393,444	397,379	401,353	405,366	409,420	413,514	417,649	421,826
	Upgrades and refurbishments	Jacobs (2020)	$ 1,200,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-	-	100,000	-	-	-	-
	Spare parts and accessories	Jacobs (2020)	$ 4,750,000	61,000	62,000	63,000	64,000	65,000	66,000	67,000	68,000	69,000	70,000	71,000	72,000	73,000	74,000	75,000	76,000	77,000	78,000	79,000	80,000	81,000	82,000	83,000	84,000	85,000	86,000	87,000	88,000	89,000	90,000	91,000	92,000	93,000	94,000	95,000	96,000	97,000	98,000	99,000	100,000
	Bores Renewals (50 years)	Jacobs (2020)	$ 1,320,000														1,320,000																										
	Mechanical Renewals (25 years)	Jacobs (2020)	$ 18,500,000														9,250,000																										
	Electrical Renewals (25 years)	Jacobs (2020)	$ 11,820,000														5,910,000																										
	Civil including Pipelines Renewals (85 years)	Jacobs (2020)	$ -																																								
	Instrumentation Control Communications (15 yrs)	Jacobs (2020)	$ 10,240,000									2,560,000															2,560,000																
	Other repair costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	RO membranes (10 years)	Jacobs (2020)	$ 7,000,000					1,000,000										1,000,000										1,000,000										1,000,000					
	Major filter renewals	Jacobs, 2020	$ 2,100,000		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	-		-	300,000	-	-	-	-	-	-	
	Total renewal costs		**$ 79,534,395**	$ 347,154	$ 351,015	$ 654,905	$ 358,825	$ 1,362,773	$ 466,750	$ 370,758	$ 374,796	$ 2,938,864	$ 382,962	$ 387,092	$ 491,253	$ 695,445	$ 16,879,670	$ 1,403,926	$ 408,216	$ 412,538	$ 516,893	$ 421,282	$ 425,705	$ 430,162	$ 434,654	$ 739,180	$ 3,103,742	$ 1,448,339	$ 452,973	$ 457,642	$ 462,349	$ 467,092	$ 571,873	$ 476,692	$ 481,549	$ 786,444	$ 491,379	$ 1,496,353	$ 601,366	$ 506,420	$ 511,514	$ 516,649	$ 521,826
Total acquisition costs			**$ 142,689,395**	$ 347,154	$ 351,015	$ 654,905	$ 358,825	$ 1,362,773	$ 466,750	$ 370,758	$ 374,796	$ 2,938,864	$ 382,962	$ 387,092	$ 491,253	$ 695,445	$ 16,879,670	$ 1,403,926	$ 408,216	$ 412,538	$ 516,893	$ 421,282	$ 425,705	$ 430,162	$ 434,654	$ 739,180	$ 3,103,742	$ 1,448,339	$ 452,973	$ 457,642	$ 462,349	$ 467,092	$ 571,873	$ 476,692	$ 481,549	$ 786,444	$ 491,379	$ 1,496,353	$ 601,366	$ 506,420	$ 511,514	$ 516,649	$ 521,826
Total leasing costs			**$ -**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Ongoing Operating and Maintenance (recurring)																																											
Maintenance costs																																											
	Scheduled/preventative maintenance	Jacobs (2020)	$ 17,920,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800	235,800
	Waste disposal	Jacobs (2020)	$ 1,064,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
	Other maintenance costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Total maintenance costs		**$ 18,984,800**	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800	$ 249,800
Operating costs																																											
	Staffing costs - Borefield and Transfer	Jacobs (2020)	$ 9,120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
	Staffing costs - GWTP	Jacobs (2020)	$ 9,880,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
	Utilities - Borefield and Transfer	Jacobs (2020)	$ 13,132,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800	172,800
	Utilities - GWTP	Jacobs (2020)	$ 52,531,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200	691,200
	Chemical Supplies and consumables	Jacobs (2020)	$ 21,888,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000
	Training	Jacobs (2020)	$ 114,000	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
	WQ monitoring	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Licences	Jacobs (2020)	$ 1,900,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
	Other operating costs (specify)	Jacobs (2020)	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Support Costs	Jacobs (2020)	$ 4,750,000	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
	Total operating costs		**$ 113,316,000**	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000	$ 1,491,000
Total operating and maintenance costs			**$ 132,300,800**	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800	$ 1,740,800
Total Costs			**$ 274,990,195**	**$ 2,087,954**	**$ 2,091,815**	**$ 2,395,705**	**$ 2,099,625**	**$ 3,103,573**	**$ 2,207,550**	**$ 2,111,558**	**$ 2,115,596**	**$ 4,679,664**	**$ 2,123,762**	**$ 2,127,892**	**$ 2,232,053**	**$ 2,436,245**	**$ 18,620,470**	**$ 3,144,726**	**$ 2,149,016**	**$ 2,153,338**	**$ 2,257,693**	**$ 2,162,082**	**$ 2,166,505**	**$ 2,170,962**	**$ 2,175,454**	**$ 2,479,980**	**$ 4,844,542**	**$ 3,189,139**	**$ 2,193,773**	**$ 2,198,442**	**$ 2,203,149**	**$ 2,207,892**	**$ 2,312,673**	**$ 2,217,492**	**$ 2,222,349**	**$ 2,527,244**	**$ 2,232,179**	**$ 3,237,153**	**$ 2,342,166**	**$ 2,247,220**	**$ 2,252,314**	**$ 2,257,449**	**$ 2,262,626**

80 year whole-of-life cost	**$ 274,990,195**		40 year NPV
80 year NPV	**$ 131,213,859**	3%	
	$ 98,566,607	5%	
	$ 81,151,532	7%	

Life cycle cost analysis - Byron Desalination

Estimated costs (2020 $)	Source	Total 80 years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Initial acquistion costs (non-recurring)																						
Capital costs																						
Capital cost - SeaPak 2500	GANDEN, 2020	$ 54,000,000	47,000,000														7,000,000					
Integration costs		$ -																				
Existing supply network modifications		$ -																				
Existing facility modifications		$ -																				
Other capital costs (specify)		$ -																				
Total initial capital costs		**$ 54,000,000**	$ 47,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,000,000	$ -	$ -	$ -	$ -	$ -
Renewals																						
Replacement UF Modules (6 years)	GANDEN, 2020	$ 23,760,000							990,000						990,000						1,980,000	
Replacement RO modules (5 years)	GANDEN, 2020	$ 13,034,547						465,520					465,520					931,039				
Total renewal costs		**$ 36,794,547**	$ -	$ -	$ -	$ -	$ -	$ 465,520	$ 990,000	$ -	$ -	$ -	$ 465,520	$ -	$ 990,000	$ -	$ -	$ 931,039	$ -	$ -	$ 1,980,000	$ -
Total acquisition costs		**$ 90,794,547**	$ 47,000,000	$ -	$ -	$ -	$ -	$ 465,520	$ 990,000	$ -	$ -	$ -	$ 465,520	$ -	$ 990,000	$ -	$ 7,000,000	$ 931,039	$ -	$ -	$ 1,980,000	$ -
Ongoing operating and maintenance (recurring)																						
Maintenance costs																						
Membrane replacement	Noted in renewal costs	$ -																				
Labour (maintenance & management)	GANDEN, 2020	$ 15,405,000		195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000
Product support	GANDEN, 2020	$ 1,015,000		100,000	75,000	50,000	25,000	25,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Environmental monitoring	GANDEN, 2020	$ 2,765,000		35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
Water quality monitoring	GANDEN, 2020	$ 1,580,000		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Total maintenance costs		**$ 20,765,000**	$ -	$ 350,000	$ 325,000	$ 300,000	$ 275,000	$ 275,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000
Operating costs																						
Electricity	GANDEN, 2020	$ 84,096,000		584,000	584,000	584,000	584,000	584,000	584,000	584,000	584,000	584,000	584,000	584,000	584,000	584,000	584,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000
Chemical consumption	GANDEN, 2020	$ 68,640		480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	960	960	960	960
Consumables	GANDEN, 2020	$ 14,300		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	200	200	200	200
Labour (operation)	GANDEN, 2020	$ 18,960,000		240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Total operating costs		**$ 103,138,940**	$ -	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 824,580	$ 1,408,580	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160
Total operating and maintenance costs		**$ 123,903,940**	$ -	$ 1,174,580	$ 1,149,580	$ 1,124,580	$ 1,099,580	$ 1,099,580	$ 1,084,580	$ 1,084,580	$ 1,084,580	$ 1,084,580	$ 1,084,580	$ 1,084,580	$ 1,084,580	$ 1,084,580	$ 1,084,580	$ 1,668,580	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160
Total Costs		**$ 214,698,487**	**$ 47,000,000**	**$ 1,174,580**	**$ 1,149,580**	**$ 1,124,580**	**$ 1,099,580**	**$ 1,565,100**	**$ 2,074,580**	**$ 1,084,580**	**$ 1,084,580**	**$ 1,084,580**	**$ 1,550,100**	**$ 1,084,580**	**$ 2,074,580**	**$ 1,084,580**	**$ 8,084,580**	**$ 2,599,619**	**$ 1,669,160**	**$ 1,669,160**	**$ 3,649,160**	**$ 1,669,160**

Estimated costs (2020 $)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Capital cost - SeaPak 2500																				
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Replacement UF Modules (6 years)					1,980,000						1,980,000						1,980,000			
Replacement RO modules (5 years)	931,039					931,039					931,039					931,039				
Total renewal costs	$ 931,039	$ -	$ -	$ -	$ 1,980,000	$ 931,039	$ -	$ -	$ -	$ -	$ 2,911,039	$ -	$ -	$ -	$ -	$ 931,039	$ 1,980,000	$ -	$ -	$ -
Total acquisition costs	$ 931,039	$ -	$ -	$ -	$ 1,980,000	$ 931,039	$ -	$ -	$ -	$ -	$ 2,911,039	$ -	$ -	$ -	$ -	$ 931,039	$ 1,980,000	$ -	$ -	$ -
Labour (maintenance & management)	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000
Product support	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Environmental monitoring	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
Water quality monitoring	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Total maintenance costs	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000
Electricity	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000
Chemical consumption	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960
Consumables	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Labour (operation)	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Total operating costs	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160
Total operating and maintenance costs	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160
Total Costs	**$ 2,600,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 3,649,160**	**$ 2,600,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 4,580,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 2,600,199**	**$ 3,649,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**

80 year whole-of-life cost	**$ 214,698,487**						
80 year NPV	**$ 107,611,954**	3%	40 year NPV	**$ 91,485,683**	2060 yield	1,550	ML/a
	$ 84,662,855	5%		**$ 78,991,236**	NPV/ML yield	$ 50,962	
	$ 73,093,725	7%		**$ 70,975,548**			

Life cycle cost analysis - Byron Desalination

Estimated costs (2020 $)	Source	Total 80 years	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Initial acquistion costs (non-recurring)																						
Capital costs																						
Capital cost - SeaPak 2500	GANDEN, 2020	$ 54,000,000																				
Integration costs		$ -																				
Existing supply network modifications		$ -																				
Existing facility modifications		$ -																				
Other capital costs (specify)		$ -																				
Total initial capital costs		**$ 54,000,000**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Renewals																						
Replacement UF Modules (6 years)	GANDEN, 2020	$ 23,760,000			1,980,000						1,980,000						1,980,000					
Replacement RO modules (5 years)	GANDEN, 2020	$ 13,034,547	931,039					931,039					931,039					931,039				
Total renewal costs		**$ 36,794,547**	$ 931,039	$ -	$ 1,980,000	$ -	$ -	$ 931,039	$ -	$ -	$ 1,980,000	$ -	$ 931,039	$ -	$ -	$ -	$ 1,980,000	$ 931,039	$ -	$ -	$ -	$ -
Total acquisition costs		**$ 90,794,547**	$ 931,039	$ -	$ 1,980,000	$ -	$ -	$ 931,039	$ -	$ -	$ 1,980,000	$ -	$ 931,039	$ -	$ -	$ -	$ 1,980,000	$ 931,039	$ -	$ -	$ -	$ -
Ongoing operating and maintenance (recurring)																						
Maintenance costs																						
Membrane replacement	Noted in renewal costs	$ -																				
Labour (maintenance & management)	GANDEN, 2020	$ 15,405,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000
Product support	GANDEN, 2020	$ 1,015,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Environmental monitoring	GANDEN, 2020	$ 2,765,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
Water quality monitoring	GANDEN, 2020	$ 1,580,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Total maintenance costs		**$ 20,765,000**	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000
Operating costs																						
Electricity	GANDEN, 2020	$ 84,096,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000
Chemical consumption	GANDEN, 2020	$ 68,640	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960
Consumables	GANDEN, 2020	$ 14,300	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Labour (operation)	GANDEN, 2020	$ 18,960,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Total operating costs		**$ 103,138,940**	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160
Total operating and maintenance costs		**$ 123,903,940**	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160
Total Costs		**$ 214,698,487**	**$ 2,600,199**	**$ 1,669,160**	**$ 3,649,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 2,600,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 3,649,160**	**$ 1,669,160**	**$ 2,600,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 3,649,160**	**$ 2,600,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**

Estimated costs (2020 $)	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Total initial capital costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Replacement UF Modules (6 years)	1,980,000						1,980,000						1,980,000						1,980,000	
Replacement RO modules (5 years)	931,039					931,039					931,039					931,039				
Total renewal costs	$ 2,911,039	$ -	$ -	$ -	$ -	$ 931,039	$ 1,980,000	$ -	$ -	$ -	$ 931,039	$ -	$ 1,980,000	$ -	$ -	$ 931,039	$ -	$ -	$ 1,980,000	$ -
Total acquisition costs	$ 2,911,039	$ -	$ -	$ -	$ -	$ 931,039	$ 1,980,000	$ -	$ -	$ -	$ 931,039	$ -	$ 1,980,000	$ -	$ -	$ 931,039	$ -	$ -	$ 1,980,000	$ -
Labour (maintenance & management)	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000
Product support	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Environmental monitoring	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
Water quality monitoring	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Total maintenance costs	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000
Electricity	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000	1,168,000
Chemical consumption	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960
Consumables	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Labour (operation)	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Total operating costs	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160	$ 1,409,160
Total operating and maintenance costs	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160	$ 1,669,160
Total Costs	**$ 4,580,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 2,600,199**	**$ 3,649,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 2,600,199**	**$ 1,669,160**	**$ 3,649,160**	**$ 1,669,160**	**$ 1,669,160**	**$ 2,600,199**	**$ 1,669,160**	**$ 1,669,160**	**$ 3,649,160**	**$ 1,669,160**

80 year whole-of-life cost	**$ 214,698,487**		
80 year NPV	**$ 107,611,954**	3%	40 year NPV
	$ 84,662,855	5%	
	$ 73,093,725	7%	

NPV Analysis												
Scenario 1: Groundwater					ML/a							
		Year available			Ultimate Proc	kWh/kL						
Stage 1	Marom Creek WTP	2025			1,570	0.91				CWT (2018)	177	kW
Stage 1	Alstonville groundwater	2025			1,280	0.52						
Stage 2	Woodburn groundwater	2029			1,600	1.21				groundwater + WTP as in Marom Creek		
Stage 3	Tyagarah groundwater Scheme 1	2032			2,048	1.61				Scheme 1, Stage 1 groundwater + WTP as in Marom Creek		
Stage 4	Tyagarah groundwater Scheme 2	2045			4,000	1.61				Same as Stage 1		
Stage 5	Newrybar groundwater	2058			2,304	2.21				groundwater + WTP as in Marom Creek		
	Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Lifecycle expenditure	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Stage 1	Marom Creek WTP		915,875	915,875	3,663,502	3,663,500	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater		492,000	7,120,000	9,164,500	9,164,500	818,023	820,423	822,837	825,265	827,707	880,164
Stage 2	Woodburn groundwater							492,000	1,720,000	2,585,000	31,685,000	1,015,425
Stage 3	Tyagarah groundwater Scheme 1									590,000	2,055,000	9,885,000
Stage 4	Tyagarah groundwater Scheme 2											
Stage 5	Newrybar groundwater											
	Total Scheme		**1,407,875**	**8,035,875**	**12,828,002**	**12,828,000**	**1,784,385**	**2,278,785**	**3,509,199**	**4,966,627**	**35,534,069**	**12,746,951**
80 year whole-of-life cost	**836,397,007**											
80 year NPV	306,176,008	3%		40 year NPV	228,911,776		Yield benefit	4,170	ML	2020-2060		
	195,922,792	5%			**169,299,256**		NPV/ML yield	40,597	$/ML			
	141,351,422	7%			131,624,542							
Energy use	Marom Creek WTP	kWh/kL					0.91	0.91	0.91	0.91	0.91	0.91
		kL					1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater	kWh/kL					0.52	0.52	0.52	0.52	0.52	0.52
		kL					1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater	kWh/kL										1.21
		kL										1,600
	Tyagarah groundwater Scheme 1	kWh/kL										
		kL										
	Tyagarah groundwater Scheme 2	kWh/kL										
		kL										
	Newrybar groundwater	kWh/kL										
		kL										
	Total Scheme						**2,087**	**2,087**	**2,087**	**2,087**	**2,087**	**4,016**
80 year NPV	279,388	3%										
	154,104	5%										
	96,281	7%										

Stage 1	Marom Creek WTP	22	hrs/d	4300	kL/d						
	Year	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
	Lifecycle expenditure	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	832,635	835,121	837,622	840,138	842,670	895,216	847,778	850,356	2,942,949	855,558
Stage 2	Woodburn groundwater	1,017,825	1,020,239	1,022,667	1,025,110	1,077,566	1,030,038	1,032,524	1,035,025	1,037,541	1,040,072
Stage 3	Tyagarah groundwater Scheme 1	37,250,000	1,301,970	1,304,970	1,307,990	1,311,030	1,314,091	1,367,172	1,320,274	1,323,397	1,626,541
	Total Scheme	**40,066,822**	**4,123,692**	**4,131,622**	**4,139,600**	**4,197,628**	**4,205,707**	**4,213,836**	**4,172,017**	**6,270,249**	**4,488,534**
Energy use	Marom Creek WTP kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
	kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
	kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater kWh/kL	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
	kL	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	Tyagarah groundwater Scheme 1 kWh/kL		1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	kL		2,048	2,048	2,048	2,048	2,048	2,048	2,048	2,048	2,048
	Total Scheme	**4,016**	**7,304**	**7,304**	**7,304**	**7,304**	**7,304**	**7,304**	**7,304**	**7,304**	**7,304**

	Year	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
	Lifecycle expenditure	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	858,184	910,825	863,483	866,158	868,849	871,557	874,283	927,025	12,739,785	882,563
Stage 2	Woodburn groundwater	1,092,619	1,045,181	1,047,758	3,140,351	1,052,961	1,055,586	1,108,228	1,060,886	1,063,560	1,066,252
Stage 3	Tyagarah groundwater Scheme 1	1,329,707	1,332,894	1,386,104	1,339,335						
Stage 4	Tyagarah groundwater Scheme 2	315,000	1,115,000	2,135,000	25,206,250	1,898,415	1,901,915	1,905,440	1,908,990	1,912,566	1,966,168
	Total Scheme	**4,561,871**	**5,370,262**	**6,398,707**	**31,518,456**	**4,786,587**	**4,795,420**	**4,854,312**	**4,863,263**	**16,682,274**	**4,881,344**
Energy use	Marom Creek WTP kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
	kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
	kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater kWh/kL	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
	kL	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	Tyagarah groundwater Scheme 1 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	kL	2,048	2,048	2,048	2,048						
	Tyagarah groundwater Scheme 2 kWh/kL					1.61	1.61	1.61	1.61	1.61	1.61
	kL					4,000	4,000	4,000	4,000	4,000	4,000
	Total Scheme	**7,304**	**7,304**	**7,304**	**7,304**	**10,438**	**10,438**	**10,438**	**10,438**	**10,438**	**10,438**

	Year	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
	Lifecycle expenditure	**2051**	**2052**	**2053**	**2054**	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	885,358	888,172	891,003	3,033,853	896,721	899,608	902,514	905,439	908,383	961,347
Stage 2	Woodburn groundwater	1,068,960	1,071,685	1,124,428	12,937,188	1,079,965	1,082,761	1,085,574	1,088,406	3,231,256	1,094,124
Stage 4	Tyagarah groundwater Scheme 2	1,919,795	1,923,449	2,227,129	1,930,836	1,934,571	1,988,332	1,942,121	1,945,938	6,570,784	2,009,657
Stage 5	Newrybar groundwater				730,000	2,560,000	12,705,000	47,160,000	1,965,800	1,968,800	1,971,820
	Total Scheme	**4,840,475**	**4,849,668**	**5,208,922**	**18,868,239**	**7,437,619**	**17,642,063**	**52,056,572**	**6,871,945**	**13,645,584**	**7,003,310**
Energy use	Marom Creek WTP kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
	kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
	kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater kWh/kL	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
	kL	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	Tyagarah groundwater Scheme 1 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	Tyagarah groundwater Scheme 2 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	kL	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
	Newrybar groundwater kWh/kL									2.21	2.21
	kL									2,304	2,304
	Total Scheme	**10,438**	**10,438**	**10,438**	**10,438**	**10,438**	**10,438**	**10,438**	**10,438**	**15,533**	**15,533**

NPV Analysis												
Scenario 1: Groundwater												
		Year available										
Stage 1	Marom Creek WTP	2025										
Stage 1	Alstonville groundwater	2025										
Stage 2	Woodburn groundwater	2029										
Stage 3	Tyagarah groundwater Scheme 1	2032										
Stage 4	Tyagarah groundwater Scheme 2	2045										
Stage 5	Newrybar groundwater	2058										
	Year	**0**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
	Lifecycle expenditure	**2020**	**2061**	**2062**	**2063**	**2064**	**2065**	**2066**	**2067**	**2068**	**2069**	**2070**
Stage 1	Marom Creek WTP		966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater		914,330	917,333	920,356	923,400	926,463	979,548	932,653	935,779	3,028,927	942,096
Stage 2	Woodburn groundwater		1,097,011	1,099,917	1,102,842	1,105,786	1,158,749	1,111,733	1,114,736	1,117,759	1,120,802	1,123,866
Stage 3	Tyagarah groundwater Scheme 1											
Stage 4	Tyagarah groundwater Scheme 2		2,266,560	3,321,491	2,416,162	2,120,152	2,124,173	2,128,223	2,132,304	2,236,416	27,265,559	2,144,733
Stage 5	Newrybar groundwater		1,974,860	1,977,921	2,081,002	1,984,104	1,987,227	2,290,371	1,993,537	2,996,724	2,099,934	2,003,165
	Total Scheme		**7,219,123**	**8,283,024**	**7,486,724**	**7,099,804**	**7,162,974**	**7,476,237**	**7,139,592**	**8,253,040**	**34,481,583**	**7,180,222**
80 year whole-of-life cost	**836,397,007**											
80 year NPV	306,176,008	3%										
	195,922,792	5%										
	141,351,422	7%										
Energy use	Marom Creek WTP	kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
		kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater	kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
		kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater	kWh/kL	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
		kL	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	Tyagarah groundwater Scheme 1	kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
		kL										
	Tyagarah groundwater Scheme 2	kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
		kL	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
	Newrybar groundwater	kWh/kL	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21
		kL	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304
	Total Scheme		**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**
80 year NPV	279,388	3%										
	154,104	5%										
	96,281	7%										

	Year	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
	Lifecycle expenditure	**2071**	**2072**	**2073**	**2074**	**2075**	**2076**	**2077**	**2078**	**2079**	**2080**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	945,287	998,499	951,734	13,804,991	958,271	961,573	964,899	1,018,248	971,620	975,016
Stage 2	Woodburn groundwater	1,176,950	1,130,056	1,133,182	3,226,329	1,139,499	1,142,689	1,195,902	1,149,137	14,497,394	1,155,673
Stage 4	Tyagarah groundwater Scheme 2	2,148,939	2,153,177	2,457,448	6,866,751	2,166,087	2,170,457	2,219,860	2,179,298	2,183,769	2,288,276
Stage 5	Newrybar groundwater	2,006,419	4,569,695	2,012,994	2,016,316	2,119,661	2,323,029	2,026,422	3,029,838	2,033,278	2,036,743
	Total Scheme	**7,243,957**	**9,817,789**	**7,521,720**	**26,880,749**	**7,349,880**	**7,564,111**	**7,373,445**	**8,342,882**	**20,652,423**	**7,422,070**
Energy use	Marom Creek WTP kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
	kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
	kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater kWh/kL	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
	kL	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	Tyagarah groundwater Scheme 1 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	Tyagarah groundwater Scheme 2 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	kL	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
	Newrybar groundwater kWh/kL	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21
	kL	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304
	Total Scheme	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**

	Year	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
	Lifecycle expenditure	**2081**	**2082**	**2083**	**2084**	**2085**	**2086**	**2087**	**2088**	**2089**	**2090**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	978,436	981,880	985,349	3,128,842	992,360	995,903	999,472	1,003,067	1,006,687	1,060,334
Stage 2	Woodburn groundwater	1,158,976	1,162,301	1,215,650	1,169,022	1,172,418	1,175,838	1,179,283	1,182,751	3,326,244	1,189,763
Stage 4	Tyagarah groundwater Scheme 2	2,192,817	2,197,394	2,502,007	2,206,656	2,211,341	2,316,063	2,900,822	2,225,619	6,835,454	2,235,328
Stage 5	Newrybar groundwater	2,140,233	17,203,747	2,047,286	2,050,851	2,054,442	2,358,058	4,721,701	3,065,370	2,069,065	2,072,788
	Total Scheme	**7,436,824**	**22,511,685**	**7,716,654**	**9,521,733**	**7,396,923**	**7,812,225**	**10,767,640**	**8,443,169**	**14,203,813**	**7,524,574**
Energy use	Marom Creek WTP kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
	kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
	kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater kWh/kL	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
	kL	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	Tyagarah groundwater Scheme 1 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	Tyagarah groundwater Scheme 2 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	kL	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
	Newrybar groundwater kWh/kL	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21
	kL	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304
	Total Scheme	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**

	Year	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
	Lifecycle expenditure	**2091**	**2092**	**2093**	**2094**	**2095**	**2096**	**2097**	**2098**	**2099**	**2100**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	1,014,007	1,017,707	1,021,434	1,025,188	1,028,969	1,082,779	1,036,616	1,040,482	14,994,377	1,048,300
Stage 2	Woodburn groundwater	1,193,306	1,196,875	1,200,469	1,204,090	1,257,736	1,211,409	1,215,109	1,218,836	1,222,590	1,226,372
Stage 4	Tyagarah groundwater Scheme 2	2,240,240	2,390,191	2,550,182	28,565,212	2,260,283	2,265,395	2,270,547	2,375,741	2,280,978	2,286,256
Stage 5	Newrybar groundwater	2,076,538	2,080,315	2,184,121	2,087,954	2,091,815	2,395,705	2,099,625	3,103,573	2,207,550	2,111,558
	Total Scheme	**7,490,453**	**7,651,450**	**7,922,567**	**33,848,805**	**7,605,166**	**7,921,650**	**7,588,259**	**8,704,995**	**21,671,857**	**7,638,848**
Energy use	Marom Creek WTP kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
	kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
	kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Woodburn groundwater kWh/kL	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
	kL	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
	Tyagarah groundwater Scheme 1 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	Tyagarah groundwater Scheme 2 kWh/kL	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	kL	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
	Newrybar groundwater kWh/kL	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21
	kL	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304	2,304
	Total Scheme	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**	**15,533**

NPV Analysis
Scenario 2a: Dunoon Dam (20GL)

			ML/a																																							
		Year available	Production	kWh/kL	Energy use kWh p.a.																																							
Stage 1	Marom Creek WTP	2025	1,570	0.91	1,421								inflation 2014-2019		1.09																												
Stage 1	Alstonville groundwater	2025	1,280	0.52	666								inflation 2019-2020		1.015																												
Stage 2a	20 GL Dunoon Dam	2029		1.60											1.106																											
	Nightcap WTP upgrade	2034		1.60		Assume increase in energy usage as for Marom Creek WTP, increase production as for DD																																							
	Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
	Lifecycle expenditure	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**
Stage 1	Marom Creek WTP		915,875	915,875	3,663,502	3,663,500	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater		492,000	7,120,000	9,164,500	9,164,500	818,023	820,423	822,837	825,265	827,707	880,164	832,635	835,121	837,622	840,138	842,670	895,216	847,778	850,356	2,942,949	855,558	858,184	910,825	863,483	866,158	868,849	871,557	874,283	927,025	12,739,785	882,563	885,358	888,172	891,003	3,033,853	896,721	899,608	902,514	905,439	908,383	961,347
Stage 2a	20 GL Dunoon Dam							55,384,835	66,406,340	66,406,340	291,448	291,448	331,448	340,697	389,945	439,191	488,436	577,680	662,394	711,636	760,876	810,116	1,460,316	906,972	956,209	1,005,444	1,054,678	2,994,966	1,186,835	1,236,066	1,285,295	1,334,524	1,423,751	1,434,597	1,483,822	1,533,046	1,582,269	14,761,294	1,654,886	1,704,106	1,753,325	1,802,543
2034 capital+1.5%p.a. recurrent	Nightcap WTP upgrade													9,691,073	9,691,073	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732
	Total Scheme		**1,407,875**	**8,035,875**	**12,828,002**	**12,828,000**	**1,784,385**	**57,171,620**	**68,195,539**	**68,197,967**	**2,085,518**	**2,137,974**	**2,130,446**	**11,833,253**	**11,885,002**	**2,536,424**	**2,588,200**	**2,729,990**	**2,767,266**	**2,819,085**	**4,960,919**	**2,922,768**	**3,575,594**	**3,074,892**	**3,076,786**	**3,128,696**	**3,180,621**	**5,123,618**	**3,318,212**	**3,420,185**	**15,282,175**	**3,474,181**	**3,566,204**	**3,579,863**	**3,631,919**	**5,823,993**	**3,736,085**	**16,917,996**	**3,814,494**	**3,866,639**	**3,918,802**	**4,020,984**

80 year whole-of-life cost	**619,141,183**										
80 year NPV	315,021,565	3%		40 year NPV	272,573,181		Yield benefit	5,370	ML	2020-2060	
	242,778,718	5%			**228,151,363**		NPV/ML yield	42,484	$/ML		
	201,127,184	7%			195,786,082						

Energy use	Marom Creek WTP	kWh/kL					0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
		kL					1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater	kWh/kL					0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
		kL					1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	20 GL Dunoon Dam	kWh/kL									1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	(from RCC supply data)	kL									278	278	278	278	278	575	873	1,171	1,468	1,766	2,063	2,361	2,659	2,956	3,254	3,551	3,849	4,146	4,444	4,741	5,039	5,336	5,634	5,931	6,229	6,526	6,824	7,121	7,419	7,716	8,014	8,311
	Nightcap WTP upgrade	kWh/kL														1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
		kL														575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575
	Total Scheme						**666**	**666**	**666**	**666**	**1,110**	**1,110**	**1,110**	**1,110**	**1,110**	**2,507**	**2,983**	**3,459**	**3,936**	**4,412**	**4,888**	**5,364**	**5,840**	**6,316**	**6,792**	**7,268**	**7,744**	**8,220**	**8,696**	**9,172**	**9,648**	**10,124**	**10,600**	**11,076**	**11,552**	**12,028**	**12,504**	**12,980**	**13,456**	**13,932**	**14,408**	**14,884**

80 year NPV	256,243	3%
	127,091	5%
	70,647	7%

NPV Analysis
Scenario 2a: Dunoon Dam (20GL)

			Year available
Stage 1	Marom Creek WTP		2025
Stage 1	Alstonville groundwater		2025
Stage 2a	20 GL Dunoon Dam		2029
	Nightcap WTP upgrade		2034
	Year		**0**
	Lifecycle expenditure		**2020**
Stage 1	Marom Creek WTP		
Stage 1	Alstonville groundwater		
Stage 2a	20 GL Dunoon Dam		
2034 capital+1.5%p.a. recurrent	Nightcap WTP upgrade		
	Total Scheme		

			41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
			2061	**2062**	**2063**	**2064**	**2065**	**2066**	**2067**	**2068**	**2069**	**2070**	**2071**	**2072**	**2073**	**2074**	**2075**	**2076**	**2077**	**2078**	**2079**	**2080**	**2081**	**2082**	**2083**	**2084**	**2085**	**2086**	**2087**	**2088**	**2089**	**2090**	**2091**	**2092**	**2093**	**2094**	**2095**	**2096**	**2097**	**2098**	**2099**	**2100**
			966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
			914,330	917,333	920,356	923,400	926,463	979,548	932,653	935,779	3,028,927	942,096	945,287	998,499	951,734	13,804,991	958,271	961,573	964,899	1,018,248	971,620	975,016	978,436	981,880	985,349	3,128,842	992,360	995,903	999,472	1,003,067	1,006,687	1,060,334	1,014,007	1,017,707	1,021,434	1,025,188	1,028,969	1,082,779	1,036,616	1,040,482	14,994,377	1,048,300
			1,891,760	1,900,976	1,950,191	1,999,405	2,048,618	6,371,368	2,111,500	2,103,586	2,095,709	2,087,867	2,683,470	2,069,445	2,062,932	2,055,230	2,047,563	16,042,609	2,032,535	2,024,970	2,017,440	2,009,944	2,042,481	1,995,447	1,989,276	1,981,913	1,974,584	18,284,056	1,909,881	1,902,650	1,895,452	1,888,286	1,921,153	1,874,051	1,866,982	1,859,944	1,852,938	4,751,037	1,877,564	1,870,652	1,863,771	1,856,921
			290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732	290,732
			4,063,184	**4,075,403**	**4,127,641**	**4,179,898**	**4,232,175**	**8,608,010**	**4,301,247**	**4,296,460**	**6,381,730**	**4,287,057**	**4,885,851**	**4,325,039**	**4,271,761**	**17,117,316**	**4,262,928**	**18,261,277**	**4,254,528**	**4,300,312**	**4,246,154**	**4,242,054**	**4,278,011**	**4,234,421**	**4,231,718**	**6,367,849**	**4,224,038**	**20,537,054**	**4,166,447**	**4,162,811**	**4,159,233**	**4,205,714**	**4,192,254**	**4,148,852**	**4,145,510**	**4,142,226**	**4,139,002**	**7,090,910**	**4,171,274**	**4,168,228**	**18,115,242**	**4,162,316**

80 year whole-of-life cost	**619,141,183**										
80 year NPV	315,021,565	3%									
	242,778,718	5%									
	201,127,184	7%									

Energy use	Marom Creek WTP	kWh/kL	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
		kL	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
	Alstonville groundwater	kWh/kL	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
		kL	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	20 GL Dunoon Dam	kWh/kL	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	(from RCC supply data)	kL	8,608	8,906	9,203	9,501	9,798	10,095	10,393	10,675	10,627	10,579	10,531	10,484	10,437	10,390	10,343	10,296	10,250	10,204	10,158	10,112	10,067	10,021	9,976	9,931	9,887	9,842	9,798	9,754	9,710	9,666	9,623	9,580	9,536	9,494	9,451	9,408	9,366	9,324	9,282	9,240
	Nightcap WTP upgrade	kWh/kL	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
		kL	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575	575
	Total Scheme		**15,360**	**15,836**	**16,312**	**16,787**	**17,263**	**17,739**	**18,215**	**18,666**	**18,589**	**18,512**	**18,436**	**18,360**	**18,285**	**18,210**	**18,135**	**18,061**	**17,986**	**17,913**	**17,839**	**17,766**	**17,693**	**17,621**	**17,549**	**17,477**	**17,405**	**17,334**	**17,263**	**17,193**	**17,122**	**17,052**	**16,983**	**16,914**	**16,845**	**16,776**	**16,708**	**16,640**	**16,572**	**16,504**	**16,437**	**16,370**

80 year NPV	256,243	3%
	127,091	5%
	70,647	7%

NPV Analysis

Scenario 2b: Dunoon Dam (50 GL)

		Year available	ML/a Production	kWh/kL	Energy use kWh p.a.
Stage 1	Marom Creek WTP	2025	1,570	incl in Alstonville	
Stage 1	Alstonville groundwater	2025	1,280	0.52	666
Stage 3	50 GL Dunoon Dam	2029			

	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13
	Lifecycle expenditure	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Stage 1	Marom Creek WTP		915,875	915,875	3,663,502	3,663,500	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater		492,000	7,120,000	9,164,500	9,164,500	818,023	820,423	822,837	825,265	827,707	880,164	832,635	835,121	837,622
Stage 3	50 GL Dunoon Dam							55,384,835	82,600,757	82,600,757	293,174	293,174	333,174	342,423	391,671
2034 capital+2%p.a. recurrent	Nightcap WTP upgrade													9,691,073	9,691,073
	Total Scheme		**1,407,875**	**8,035,875**	**12,828,002**	**12,828,000**	**1,784,385**	**57,171,620**	**84,389,955**	**84,392,384**	**2,087,244**	**2,139,700**	**2,132,172**	**11,834,979**	**11,886,728**

	Year	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Lifecycle expenditure	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	840,138	842,670	895,216	847,778	850,356	2,942,949	855,558	858,184	910,825	863,483	866,158	868,849	871,557	874,283
Stage 3	50 GL Dunoon Dam	440,917	490,162	579,406	665,846	715,088	764,328	813,568	1,463,768	910,424	959,661	1,008,896	1,058,130	2,998,418	1,191,037
2034 capital+2%p.a. recurrent	Nightcap WTP upgrade	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643
	Total Scheme	**2,635,060**	**2,686,837**	**2,828,627**	**2,867,629**	**2,919,448**	**5,061,282**	**3,023,131**	**3,675,957**	**3,175,254**	**3,177,149**	**3,229,058**	**3,280,984**	**5,223,981**	**3,419,325**

	Year	28	29	30	31	32	33	34	35	36	37	38	39	40
	Lifecycle expenditure	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**	**2055**	**2056**	**2057**	**2058**	**2059**	**2060**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	927,025	12,739,785	882,563	885,358	888,172	891,003	3,033,853	896,721	899,608	902,514	905,439	908,383	961,347
Stage 3	50 GL Dunoon Dam	1,240,268	1,289,497	1,338,726	1,427,953	1,438,799	1,488,024	1,537,248	1,586,471	14,958,246	1,658,564	1,707,784	1,757,003	1,806,221
2034 capital+2%p.a. recurrent	Nightcap WTP upgrade	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643
	Total Scheme	**3,521,298**	**15,383,288**	**3,575,294**	**3,667,317**	**3,680,975**	**3,733,032**	**5,925,106**	**3,837,198**	**17,211,859**	**3,915,083**	**3,967,228**	**4,019,391**	**4,121,573**

80 year whole-of-life cost	**658,907,966**									
80 year NPV	343,939,167	3%		40 year NPV	300,668,234		Yield benefit	13,249	ML	2020-2060
	267,518,613	5%			**252,602,785**		NPV/ML yield	19,066	$/ML	
	222,665,849	7%			217,217,821					
Energy use	same as 2a									

NPV Analysis

Scenario 2b: Dunoon Dam (50 GL)

Stage 1	Marom Creek WTP
Stage 1	Alstonville groundwater
Stage 3	50 GL Dunoon Dam

	Year	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Lifecycle expenditure	**2061**	**2062**	**2063**	**2064**	**2065**	**2066**	**2067**	**2068**	**2069**	**2070**	**2071**	**2072**	**2073**	**2074**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	914,330	917,333	920,356	923,400	926,463	979,548	932,653	935,779	3,028,927	942,096	945,287	998,499	951,734	13,804,991
Stage 3	50 GL Dunoon Dam	1,895,438	1,904,654	1,953,869	2,003,083	2,052,296	6,375,046	2,115,928	2,108,014	2,100,137	2,092,295	2,687,898	2,073,873	2,067,360	2,059,658
2034 capital+2%p.a. recurrent	Nightcap WTP upgrade	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643
	Total Scheme	**4,163,773**	**4,175,992**	**4,228,230**	**4,280,487**	**4,332,764**	**8,708,598**	**4,402,586**	**4,397,799**	**6,483,069**	**4,388,396**	**4,987,189**	**4,426,377**	**4,373,099**	**17,218,654**

	Year	55	56	57	58	59	60	61	62	63	64	65	66	67
	Lifecycle expenditure	**2075**	**2076**	**2077**	**2078**	**2079**	**2080**	**2081**	**2082**	**2083**	**2084**	**2085**	**2086**	**2087**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	958,271	961,573	964,899	1,018,248	971,620	975,016	978,436	981,880	985,349	3,128,842	992,360	995,903	999,472
Stage 3	50 GL Dunoon Dam	2,051,991	16,510,066	2,036,999	2,029,434	2,021,904	2,014,408	2,046,945	1,999,911	1,993,740	1,986,377	1,979,048	18,247,810	1,913,562
2034 capital+2%p.a. recurrent	Nightcap WTP upgrade	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643
	Total Scheme	**4,364,267**	**18,825,645**	**4,355,903**	**4,401,687**	**4,347,529**	**4,343,429**	**4,379,386**	**4,335,796**	**4,333,093**	**6,469,224**	**4,325,413**	**20,597,718**	**4,267,039**

	Year	68	69	70	71	72	73	74	75	76	77	78	79	80
	Lifecycle expenditure	**2088**	**2089**	**2090**	**2091**	**2092**	**2093**	**2094**	**2095**	**2096**	**2097**	**2098**	**2099**	**2100**
Stage 1	Marom Creek WTP	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362	966,362
Stage 1	Alstonville groundwater	1,003,067	1,006,687	1,060,334	1,014,007	1,017,707	1,021,434	1,025,188	1,028,969	1,082,779	1,036,616	1,040,482	14,994,377	1,048,300
Stage 3	50 GL Dunoon Dam	1,906,331	1,899,133	1,891,967	1,924,834	1,877,732	1,870,663	1,863,625	1,856,619	4,754,718	1,881,815	1,874,903	1,868,022	1,861,172
2034 capital+2%p.a. recurrent	Nightcap WTP upgrade	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643	387,643
	Total Scheme	**4,263,403**	**4,259,825**	**4,306,306**	**4,292,845**	**4,249,444**	**4,246,101**	**4,242,818**	**4,239,593**	**7,191,502**	**4,272,436**	**4,269,390**	**18,216,404**	**4,263,478**

80 year whole-of-life cost	**658,907,966**
80 year NPV	343,939,167
	267,518,613
	222,665,849
Energy use	same as 2a

Appendix 2. MULTI-CRITERIA ANALYSIS

Criteria	Environmental Criteria			Environmental Score	Environmental Weighting	Social Criteria			Social Score	Social Weighting	Net present value ($ million)	Total Score per $NPV
	Aquatic	Terrestrial	Energy consumption			Typical residential bill	Water users	Heritage				
Description	Impact on groundwater and surface water quality and aquatic ecology and measures to offset those impacts.	Impact on terrestrial ecology and measures to offset those impacts.	80 year energy consumption (MWh)	Weighted criteria score	Weighting compared to social criteria	Impact on the typical residential bills for each Council from the revised notional cost.	Impact on other water users and measures to offset those impacts.	Impact on cultural heritage and measures to offset those impacts.	Weighted criteria score	Weighting compared to environmental criteria	NPV of capital and operating costs (80 years) at 5% discount rate	10^{3x}(Environmental Score + Social Score)/NPV
Criteria weighting	33%	33%	33%	100%		33%	33%	33%	100%			
Scenario 1: Groundwater												
Result	Some potential impacts on GDEs. Impacts can be minimised through site selection and monitoring	Impacts can be minimised through site selection	154,000	**3.00**		1.21	Impacts can be minimised through site selection and monitoring	Impacts can be minimised through site selection	**3.35**		196	**16.2**
Score	3	4.0	2.0			2.55	3.5	4.0				
Scenario 2A: Dunoon Dam (20 GL)												
Result	Significant impacts are partially offset by environmental flow regime	Significant impacts are partially offset by compensatory measures	127,000	**2.67**	50%	1.30	Significant impacts are partially offset by environmental flow regime and extraction rules	Significant impacts are unlikely to be mitigated	**2.16**	50%	243	**9.9**
Score	2.5	2.5	3.0			2.48	2.5	1.5				
Scenario 2B: Dunoon Dam (50 GL)												
Result	Significant impacts are partially offset by environmental flow regime	Significant impacts are partially offset by compensatory measures	127,000	**2.33**		1.30	Significant impacts are partially offset by environmental flow regime and extraction rules	Significant impacts are unlikely to be mitigated	**1.83**		268	**7.8**
Score	2.0	2.0	3.0			2.48	2.0	1.0				
Score out of 5	5 - highest											

Final draft Delivery program/Operational plan and 2020/21 Budget

(2092/17)

Business activity priority	Strategy and planning
Goal 2	Align strategic direction to core functions and sustainability

Recommendation

That Council:

1. Receive and note that no submissions were lodged during the public consultation process outlined in the report.
2. Note the maximum interest rate on overdue rates and charges contained in NSW Office of Local Government Circular 20-19.
3. Adopt the final draft Delivery program/Operational plan (incorporating the 2020/21 Budget estimates and 'Revenue' policy).

Background

Council approved public exhibition of the draft Delivery program/Operational plan (incorporating the 2020/21 Budget estimates and 'Revenue' policy) at its 15 April 2020 meeting.

The public consultation period concluded at 4.30pm on 21 May 2020 and no public submissions were received.

Update from the Office of Local Government – Circular 20-19

The NSW Office of Local Government issued circular 20-19 'Information about Ratings 2020-21' on Tuesday 26 May 2020.

This circular identified one change that is required to the draft 'Revenue' policy.

The maximum interest rate on overdue rates and charges in accordance with section 566(3) of the Act, has been set at 0.0% for the first half of the 2020-21 financial year in response to the financial impacts faced by the community as a result of the COVID-19 Pandemic.

The interest rate will then be set at 7.0% for period 1 January to 30 June 2021.

Governance

Finance

At the time of preparing this report no submissions had been received. However, it is noted that two reports will be presented to Council at the June 2020 meeting that, if approved, will require additional funding in the 2020/21 financial year.

Legal

Adoption of an Operational plan before the beginning of each financial year is a requirement of the *Local Government Act 1993*. The Operational plan is a sub-plan of the Delivery program and includes Council's 'Revenue' policy containing proposed fees and charges for the upcoming financial year. A draft Operational plan must be publicly exhibited for at least 28 days, and Council must accept and consider any public submissions made on the draft before its adoption.

No public submissions were received.

The proposed Operational plan outlines activities to be undertaken throughout the 2020/21 year to achieve the strategies in Year 4 of the Delivery program, as part of Council's 2017-21 Business Activity Strategic Plan (adopted by Council on 21 June 2017; [50/17]).

Consultation

It should be noted that legislative changes in response to the COVID-19 pandemic removed the requirement for public notice to be affected through advertisement in the newspaper. Councils are now required to publish notices on their websites and in such other manner that they consider necessary to bring it to the notice of the local community or other interested persons.

Notice of public consultation was provided on in the Northern Star and Council's website on 23 April 2020 with the closing date for lodgement of submission being 4:30pm on 21 May 2020.

Richmond Valley Council provided a letter of support for the adoption of the publicly exhibited documents advising that they were satisfied with the fees, charges and service level agreement. No other public submissions were received.

Conclusion

Following a period of public consultation, the final draft Delivery program/Operational plan (incorporating the 2020/21 Budget estimates and 'Revenue' policy) is presented to Council for adoption.

Phillip Rudd
General Manager

Attachment:

1. Office of Local Government Circular 20-12 dated 17 April 2020: Modification of statutory requirements in response to the COVID-19 pandemic

2. Delivery program/Operational plan (incorporating the 2020/21 Budget estimates and 'Revenue' policy)

NSW GOVERNMENT Office of Local Government

Circular to Councils

Strengthening local government

Circular Details	20-12/ 17 April 2020 / A696830
Previous Circular	20-06 Novel Coronavirus (COVID-19) Development Updates
Who should read this	General Managers / Finance, Governance and Integrated Planning and Reporting staff
Contact	Council Performance Team / 02 4428 4100 / olg@olg.nsw.gov.au
Action required	Council to Implement

Modification of statutory requirements in response to the COVID-19 pandemic

What's new or changing

- Regulations have been made under section 747B of the *Local Government Act 1993* to temporarily modify the application of the Act in response to the COVID-19 pandemic. The regulations made under section 747B modify the Act as follows:
- Councils have been provided with a one-month extension:
  - to adopt their 2020-21 Operational Plan (including Revenue Policy, Statement of Fees and Charges and annual budget) before 31 July 2020;
  - to submit audited financial reports by 30 November 2020; and
  - for the preparation and publishing of annual reports by 31 December 2020.
- Councils have the option to delay issuing rates notices to ratepayers until 1 September 2020, and the collection of the first quarter rates instalment until 30 September 2020.
- Councils may immediately waive or reduce fees under a new "COVID-19" category.
- The requirement for councils to make certain documents available for physical inspection at their offices has been modified to allow access to the documents to be provided remotely.
- In addition to these temporary measures, in response to the closure of some local newspapers and to assist councils to reduce their costs, the *Local Government (General) Regulation 2005* (the Regulation) has been amended to remove requirements for newspaper advertising. This amendment is not temporary and will continue to apply after the COVID-19 pandemic passes.

What this will mean for your council

- The COVID-19 pandemic has caused an exceptional set of circumstances with unprecedented impacts. The NSW Government is committed to supporting local councils and their communities during this period of uncertainty.
- To provide NSW councils with flexibility to adjust to the rapidly shifting circumstances and to allow them to provide appropriate financial support to their local communities, a number of statutory deadlines for 2019-20 and 2020-21 have been modified. These are set out in the table below:

Section of LG Act	Prior deadline	New deadline
Submission of audited Financial Reports – 416(1)	31 October 2020	**30 November 2020**
Preparation and publish of Annual Reports – 428(1)	30 November 2020	**31 December 2020**

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Locked Bag 3015 NOWRA NSW 2541
T 02 4428 4100 F 02 4428 4199 TTY 02 4428 4209
E olg@olg.nsw.gov.au W www.olg.nsw.gov.au ABN 20 770 707 468

Section of LG Act	Prior deadline	New deadline
Adoption of Operational Plan - 405(1)	By 1 July 2020	**By 1 August 2020**
Making of a rate or charge - 533	By 1 August 2020	**By 1 September 2020**
Date by which quarterly rates are payable - 562(3)(a)	31 August 2020	**30 September 2020**
Quarterly review statements (QBRS) - Cl 203(1) of Regulation	The third quarter 2019-20 QBRS (currently due May 2020)	Third quarter QBRS - **June 2020.** All future QBRS remain due as per Regulation.

- In exercising discretion to extend the making of a rate or charge under section 533 or the collection of rates under 562(3)(a) of the Act, each Council must consider both the financial circumstances of local ratepayers and the potential impact such actions would have on the general cashflow of Council.
- The Government recognises that there may be circumstances where adopting such extensions may not be appropriate or desirable for councils.
- Councils do not need to resolve to extend the date to adopt its Operational Plan, issue rates notices or collect the first rates instalment. A council may, however, choose to direct its General Manager to submit an Operational Plan for adoption prior to 1 July 2020 and to ensure that its rates and charges notices are served by 1 August 2020 (as is normally the case under legislation).
- Councils should also note that there are no changes to the provisions in the following table at this time. However, the Government is continuing to monitor the broader strategic and operating environment for local councils.

Section	Ongoing requirement
405(2)	Councils Operational Plan must include a statement of a council's revenue policy
405(3)	Council must give public notice of draft Operational Plan for not less than 28 days
405(6)	Council must post a copy of its Operational Plan on website within 28 days after the plan is adopted

Extension of the ability of councils to waive or reduce fees

- The application of section 610E of the Act has been broadened to allow councils to waive or reduce fees under a newly established "COVID-19" category, which has been added to the Regulation.
- This means that councils can immediately apply the waiver or reduction without establishing a new category or going through the normal public notice requirements of section 610E(2) for adding new categories.
- Councils may choose to apply such a waiver or reduction, for example, in cases where a business has seen significantly reduced income as a result of COVID-19. The application of any such waiver or reduction of fees is voluntary and is decision for each council based on local circumstances.
- Councils do not need to resolve to waive or reduce fees under the "COVID-19" category if the existing powers delegated to the General Manager include the power to determine a new category in which a council may waive or reduce fees.

Modification of requirements for councils to make certain documents available for inspection

- Under the regulations, the requirements under the Act for councils to make documents physically available for inspection will be satisfied if:

- in the case of a document that is "open access information" for the purposes of the *Government Information (Public Access) Act 2009* (the GIPA Act), the information contained in the document is published on the council's website and is made available on request in an electronic form or in such other manner determined by the council.
- in the case of a document that is not "open access information" for the purposes of the GIPA Act, the information contained in the document is made available on request in an electronic form or in such other manner determined by the council.

Removal of newspaper advertising requirements under the Regulation

- To alleviate the red tape burden on councils and to reduce their costs, amendments have also been made to the Regulation to remove remaining requirements for notices to be published in newspapers.
- Councils are now instead required to publish notices on their websites and in such other manner that they consider necessary to bring it to the notice of the local community or other interested persons.

Key points

- Regulations may be made under section 747B to modify the application of the Act for the purposes of responding to the public health emergency caused by the COVID-19 pandemic.
- Regulations may only be made under section 747B if:
  - Parliament is not currently sitting and is not likely to sit within 2 weeks after the day the regulations are made, and
  - the arrangements made by the provisions of the regulations are in accordance with advice issued by the Minister for Health and Medical Research or the Chief Health Officer, and
  - the regulations are reasonable to protect the health, safety and welfare of persons.
- Regulations made under section 747B automatically expire after 6 months or earlier if decided by the Parliament.

Where to go for further information

- For further information please contact the Council Performance Team on 02 4428 4100 or by email at olg@olg.nsw.gov.au.

Tim Hurst
Deputy Secretary
Local Government, Planning and Policy

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E olg@olg.nsw.gov.au **W** www.olg.nsw.gov.au **ABN** 20 770 707 468

Attachment 2

Integrated planning and reporting framework

2017/2021

- Business activity strategic plan
- Resourcing strategy
- Delivery program | Operational plan

ROUS
COUNTY COUNCIL

Acknowledgement of country

We recognise the traditional owners of the land and pay tribute to elders past and present.

Version	Purpose and description	Date adopted by Council	Resolution no.
2.0	Endorsed at Council meeting 17 May 2017 for public consultation	17 May 2017	43/17
2.0	Adoption of final Framewor	21 June 2017	50/17
3.0	Draft Delivery Program/Operational Plan (incl. Revenue Policy and Budget) endorsed at Council meeting 16 May 2018 for public consultation	16 May 2018	35/18
3.1	Adoption of final Pla	20 June 2018	44/18
4.0	Draft Delivery Program/Operational Plan (incl. Revenue Policy and Budget) endorsed at Council meeting 17 April 2019 for public consultation	17 April 2019	18/19
4.1	Adoption of final Pla	19 June 2019	36/19
5.0	Draft Delivery Program/Operational Plan (incl. Revenue Policy and Budget) endorsed at Council meeting 15/04/2020 for public consultation.	15 April 2020	13/20
5.1	Change to ‘Borrowings’, page 46.	27 April 2020	
5.2	Change to ‘Interest’, page 49.	3 June 2020	

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Contents

Who we are

Rous County Council is a county council constituted under the Local Government Act 1993. Our governing body has eight members (consisting of two representatives from each of Ballina, Byron, Lismore City and Richmond Valley Councils) each of whom are appointed for four years.

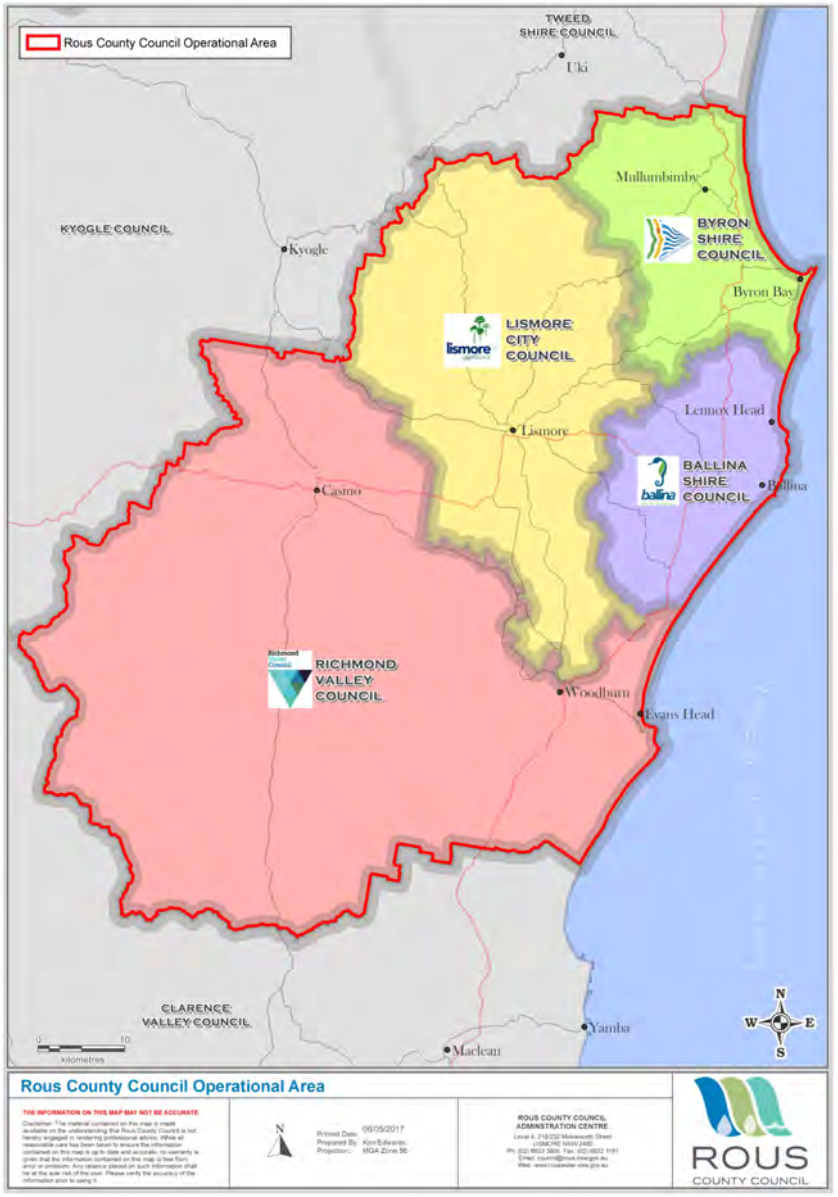
Council meets on the third Wednesday of February, April, June, August, October, and December at 1.00pm. On the third Wednesday of the month when meetings are not scheduled to be held, Council will hold briefings / workshops at 1.00pm, unless, in consultation with the Chair, the General Manager determines that there is no substantial matter required for discussion.

Public attendance at meetings is welcome with 'public access' a standing item on the meeting agenda. A person may address council about any matter included in the business paper for the meeting.

Business papers (excluding confidential content) are available online at: www.rous.nsw.gov.au or in hard copy from our office at Level 4, 218/232 Molesworth Street, Lismore NSW 2480, Monday to Friday between 8.30am and 4.30pm.

We also have a number of committees that inform and support the decision making of the governing body: Audit Risk and Improvement Committee, Reconciliation Action Plan Advisory Group. The membership of these groups is often a combination of governing body members and independent community members.

Our footprint



What we do

Supply water in bulk

We are the regional water supply authority providing water in bulk to the local government areas of Lismore (excluding Nimbin), Ballina (excluding Wardell), Byron (excluding Mullumbimby) and Richmond Valley (excluding land to the west of Coraki). A population of around 100,000 is serviced by this water supply system with the actual area of operations being approximately 3,000km^2.

The regional supply network includes around 43,000 connections within the reticulation areas of the local government areas that it services and nearly 2,000 retail connections to our trunk main system. Reticulation of the water within the urban centres is the responsibility of our member Councils.

The principal source of our supply network is Rocky Creek Dam, situated 25km north of Lismore near the village of Dunoon. The dam has a storage capacity of 14,000ML.

Other available sources under our control include Emigrant Creek Dam, Convery's Lane and Lumley Park bores in the Alstonville area, as well as bores in the Richmond Valley area.

Our water infrastructure is valued in excess of $250M. This includes the physical trunk main and pipeline system as well as reservoirs, Rocky Creek Dam, Emigrant Creek Dam, Wilsons River Source, two water treatment plants (Emigrant Creek and Habbie Habib Nightcap) and a range of public access and recreation areas in and around Rocky Creek Dam and Emigrant Creek Dam.

We implement a multi-barrier approach to water quality management – this means that at each stage of the water collection, storage and delivery process we actively manage water quality. Catchment protection is a key barrier in drinking water quality protection - minimising contamination before it reaches the water treatment plant is considered a vital step for reducing drinking water-related health risks. We work with a wide range of catchment partners to improve the quality of water flowing from the catchments areas into our streams and water sources. Our Water and Rainforest Reserve at Rocky Creek Dam is a popular destination that showcases the benefits of long-term commitment to catchment protection and Big Scrub restoration.

Exercise powers and duties in relation to weed biosecurity

Our goals are to:

- **Exclude** new noxious weeds (prevent them establishing in our region).
- **Eradicate or contain** any new noxious weeds found in our region (eliminate them or stop their spread).
- **Effectively manage** the impacts of widespread invasive noxious weeds species.
- **Build capacity** in our region to help the community, industry and government commit to long-term management of invasive noxious weeds.

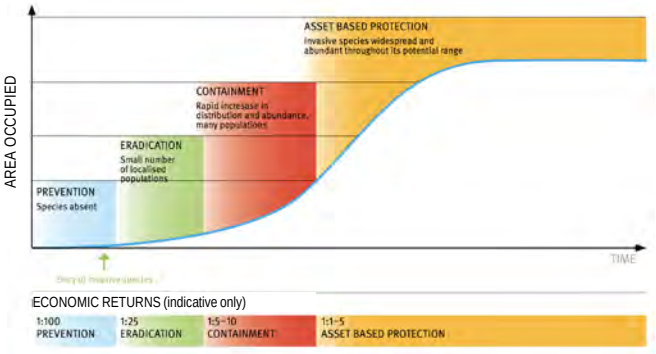
To achieve this we focus on:

- Identifi ation and management of high-risk weed species and how they spread into and within our region.
- Improving our capacity to find new weeds early.
- Ensuring we have the resources and procedures to take rapid strategic control measures against new weeds in our region.
- Directing our resources to where benefits will be the greatest.
- Increasing community commitment and involvement in proactive weed management.

We also deliver weed biosecurity services under a service level agreement arrangement to the councils of Kyogle and Tweed Shire.

Prioritising biosecurity investments

Generalised invasion curve showing actions appropriate to each stage



*Invasion Curve sourced from Biosecurity Victoria, Department of Primary Industries, Victoria

Prevent and mitigate menace to the safety of life or property from floods and natural resource management issues arising therefrom

Our service delivery relates to flood mitigation in the rural environment (not urban areas). Our natural resource management function relates only to the environmental consequence resulting from the operation of this infrastructure on the broad environment.

We are responsible for the construction, replacement and routine maintenance of various flood mitigation infrastructure. This includes floodgates and some rural drains and canals. In addition, we also have a key role in relation to an urban levee designed to protect the central business district of Lismore against a 1 in 10 year flood.

The Lismore levee is a flood mitigation system comprising a 2km concrete flood levee bank. While we own the levee, Lismore City Council is responsible for its maintenance and operation. It is supported by an auxiliary flood mitigation system consisting of: the South Lismore levee which is 5.5km in length and designed to protect the area of South Lismore against a 1 in 10 year flood; a pop-up deflector wall; Browns Creek pump station; and doorway floodgates for some local flood affected businesses. The levee was constructed in 2002 by the former Richmond River County Council at the request of Lismore City Council, with funding provided by Lismore, the Commonwealth and State governments.

We also have a strong interest in activities such as hydrological research, flood surveying and modelling. This enables us to better understand flood behaviours and the impact of flooding on the catchment and floodplain.

As a flood mitigation authority we also partner with our member councils to coordinate the preparation and submission of grant funding applications for agreed regional projects.

1

Business activity strategic plan

What does Integrated Planning and Reporting mean?

VISION

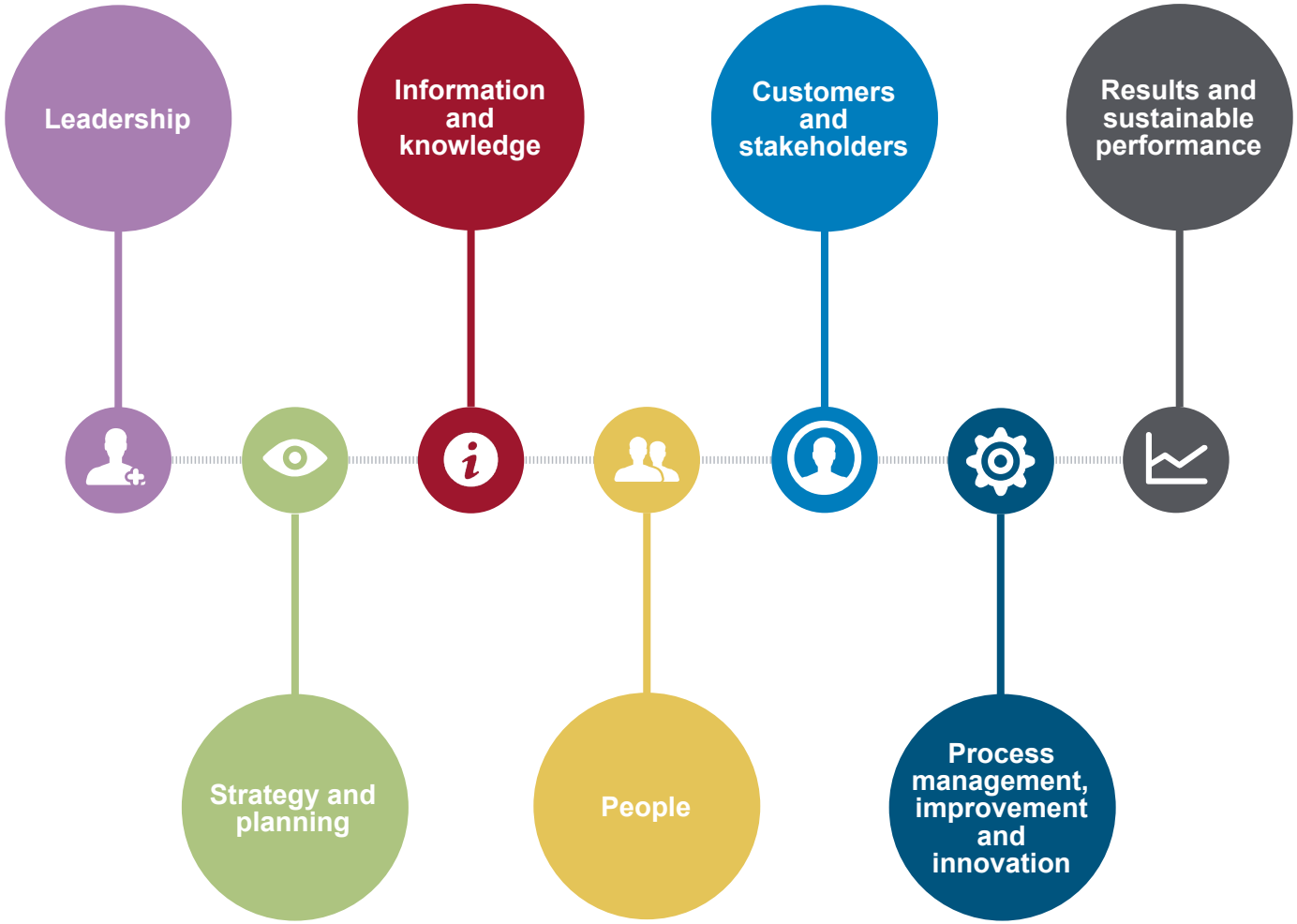
Thrive and evolve as a valued regional service provider.

MISSION

Partner with our constituent councils to provide quality services that support a sustainable and productive region.

VALUES

Safety
Teamwork
Accountability
Respect



Integrated Planning and Reporting priorities

	Leadership	Strategy and planning	Information and knowledge	People	Customers and Stakeholders	Process management, improvement and innovation	Results and sustainable performance
Quadruple bottom line							
Goals	**1.** Values based leadership and culture.	**2.** Align strategic direction to core functions and sustainability.	**3.** Create value through applying knowledge.	**4.** Organisational capability through our people.	**5.** Proactive management of relationships with member councils and key stakeholders.	**6.** Continuous improvement through process management and innovative thinking.	**7.** Sustainable performance.
Achievement looks like	**1.1** Leaders are visible at all levels of the organisation and are supported to effectively lead and drive performance.	**2.1** Being responsive to the impact of population growth on core functions. **2.2** Strategic partnerships/ relationships supportive of our mission and vision. **2.3** Business activity contributes to local and regional growth and optimal environmental outcomes. **2.4** Converting strategy into action plans that anticipate and accommodate change and allocate accountability.	**3.1** We will better utilise the knowledge and expertise of our people and the knowledge embedded in our organisational systems to inform decision-making and enhance transparency, business continuity and resilience.	**4.1** A high performing team enriched through diversity. **4.2** A workplace where safety and wellbeing come first.	**5.1** Mutual understanding of needs, priorities, expectations, functions, operations, service standards, span of control and influence.	**6.1** Recognising and being open to opportunities for improvement through innovation.	**7.1** We are recognised as a valued regional service provider and reliable cost effective deliverer of our core functions and operations. **7.2** Levels of service align with agreed priorities, financial and asset capability and long-term financial plans.
Resources required							
Success looks like	• Improved leadership and management skills. • Leaders supported to lead. • that are proud, confident and visible at all levels of the organisation. • A strong culture that aligns with our Values.	• Leadership strategy aligned to Vision, Mission and Values. • Informed decision making. • Strong relationships between Council and Traditional Custodians and Aboriginal and Torres Strait Islander peoples. • Strategy that converts into action.	• Getting the most out of our technology and systems. • Systems that create efficiencies, consolidate data and enable us to share knowledge easily. • Having adequate resources to meet our committed service standards and levels. • Rewarding and recognising success and high performer.	• Being proud of each other and our great workplace • People that are trained and competent to carry out work safely and skilfully. • Everyone knowing that 'Safety first' is how we do business; no exceptions - ever - zero harm. • Achieving targets on time and on budget. • Visibility of team performance (activity v. outcome). • Gaining knowledge and learning from experience.	• Proactively engaging member councils and key stakeholders. • Strong, solution focussed and respect based relationships. • Being easy to do business with. • Member councils and stakeholders regularly providing honest and timely performance feedback. • Feedback is used to achieve continuous improvement. • Member councils understanding and accepting the basis for calculating financia contributions.	• Process dependencies and interdependencies identified. • Innovative thinking in how we do business. • A workforce adequate in number and capability to meet agreed levels of service. • A sustainable talent pipeline that reflects future business needs. • Informed and detailed plans. • Innovation and continuous improvement is 'business as usual'. • Process management achieves positive and sustained results.	• Being a valued regional service provider. • Providing quality services that support a sustainable and productive region. • A pricing structure reflects sustainable financial management. • Services delivered at agreed standards and levels. • Performance and results communicated across our organisation and used for learning and continuous improvement.

KEY: Social Environmental Economic Governance Money People Assets

Challenges faced in Integrated Planning and Reporting

Leadership
- Accepting and adjusting to change
- Prioritising leadership development
- Understanding:
  - the role of leaders in our organisation and the reasons why decisions are made
  - the difference between leaders and managers
  - that leadership decisions are not always popular or easy

Strategy and planning
- External factors beyond our control
- Community expectations and understanding
- Regional growth and climate change impacts
- Being realistic about our capacity to deliver projects
- Engagement with private landholders to achieve catchment and natural resource management outcomes
- Consistent and proactive delivery of reconciliation actions

Information and knowledge
- Understanding where opportunities exist and where to invest our efforts for the best return
- Knowing when it will be most beneficial to buy in expertise to supplement existing knowledge or capacity to deliver projects
- Developing an effective reward and recognition program
- Identifying where unique skill sets and technical competencies exist and building business continuity in those areas

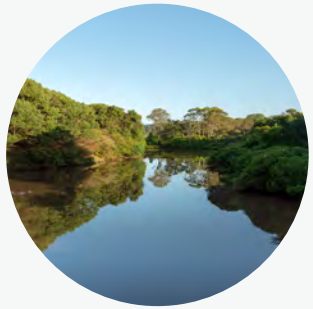
People
- Combining the functions of three entities
- Everyone knowing what they are required to do and are held to account for their performance
- Aligning our efforts with our strategic objectives and operational activities
- Managing morale in a constantly changing and dynamic environment
- Building our brand as an employer of choice

Customers and stakeholders
- Maintaining effective communications
- Rapidly adapting to change within current resource capacity
- Prioritising member council and key stakeholder relationships
- Managing different perspectives and expectations

Process management, improvement and innovation
- Understanding the capability of our technology and systems
- Responding to the speed of change and understanding its impacts
- Identifying the best-fit solution
- Learning from eachother and our experiences
- Understanding the processes between Branches and handover points

Results and sustainable performance
- Maintaining adequate operational capacity
- Building and maintaining the commitment of our partners in the delivery of our activities
- Maximising the deployment of existing human resources to achieve optimum productivity
- Rapidly responding to changing regulatory requirements
- Recognising where our optimum efficiencies are achieved based on cost v. benefit
- Maintaining focus on core functions and activities of our county

Integrated Planning and Reporting in practice



Planning for the future

…knowing our purpose and goals and how each person in our workforce contributes to achieving them…

…it is the roadmap to achieving our Vision and Mission...

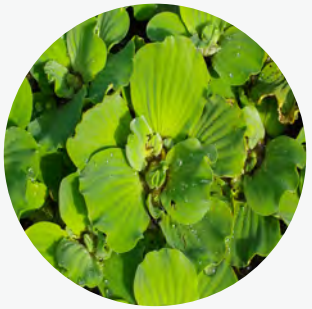
…it sets out what we will do in the long, medium and short term, how we will do it and how we will measure our performance…

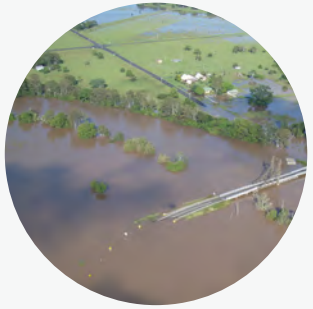
Translating the strategy into action

…the high level strategy is unpacked into specific actions through the Delivery program | Operational plan…

…our strategic priorities are supported by a series of goals or objectives and actions…

…each action is aligned with and designed to contribute to the achievement of a strategic priority...





Accountability for doing what we say we will

…one of our corporate Values that features heavily in our Integrated Planning and Reporting framework...

…reporting at least 6 monthly to our governing body reveals whether we are on track or not in delivering against our Delivery program and Operational plan...

...if we are on track we need to recognise and celebrate that. If we are not, we need to be honest about that, understand why and do something about it…

Elements of Integrated Planning and Reporting

1 Business activity strategic plan

Description:

- Main business activity priorities
- Strategic objectives and strategies for achieving those objectives
- Informed by other key strategies (e.g. Disability Inclusion Action Plan and Reconciliation Action Plan)
- Endorsed by Council
- Covers a period of 10+ years

Review: Every 4 years

2 Resourcing strategy

Description:

Long term financial pla

- Modelled on a 30 year timeframe; includes projected income and expenditure, balance sheet and cash flow statement; planning assumptions used to develop the Plan; sensitivity analysis; financial modelling; methods of monitoring financial performan e

Workforce management plan

- Modelled on a min. 4 year timeframe; includes human resourcing requirements for the Delivery program

Asset management strategy and plan

- Modelled on a 20 year timeframe; includes an Asset management policy; Strategy (identifies assets that are critical to Council operations and outline the risk management strategies for these assets; includes specific actions required to improve Council's asset management capability and projected resource requirements and timeframes); Plan (encompasses all the assets under Council's control; identifies asset service standards; contains long term projections of asset maintenance, rehabilitation and replacement costs)

Review:

Reviewed in detail every 4 years in conjunction with the Business activity strategic plan

Updated annually when developing the Operational plan

3 Delivery program + Operational plan

Delivery program portion description:

- Activities to be undertaken to implement the Business Activity Strategic Plan
- Adopted by Council
- Covers a period of 4 years

Review: Every 4 years

Operational plan portion description:

- Sub-plan of Delivery program
- Adopted by Council
- Covers a period of 1 year

Review: Annual

Delivering Integrated Planning and Reporting

Integrated Planning and Reporting is a legal requirement under the Local Government Act 1993.

Planning

The individual elements consist of a long term business plan (Business activity strategic plan), a 4 year Delivery program, a 1 year Operational plan and a Resourcing strategy. The Resourcing strategy consists of a 30 year long term financial plan, 4 year Workforce management plan and a 20 year Asset management strategy and plan.

Reporting

We publicly report on our achievements and performance in the following ways:

	To whom	When and about what
Annual report	Council Community	• Once a year. • Our achievements in implementing the Delivery program. It includes information about the effectiveness of the principal activities undertaken in achieving the objectives in the Business activity strategic plan.
State of the Environment report	Council Community	• Once every 4 years (by 30 November in the year in which an ordinary election is held). • A health report on the state of the environment in the local government area relevant to the objectives for the environment established in the Business activity strategic plan. Our next State of the Environment report will be delivered in 2020 as a co-ordinated regional initiative with councils across the north and mid-north coast.
Progress report on Delivery program	Council	• At least every six months. • Includes our performance in delivering services under Service Level Agreements in place with member councils.
Quarterly Budget Review Statement	Council	• Quarterly. • A financial health report containing information about financial position in order to enabl informed decision making and to ensure that we are on track to meet our objectives, targets and outcomes as set out in the Operational plan. The Code of Accounting Practice and Financial Reporting prescribes the minimum requirements that must be reported.

Informing our framework

Social justice principles

The NSW Government's social justice strategy consists of four elements: equity, access, participation and rights. Our business activity strategic plan has been developed having regard for these principles through:

- Targeted consultation and engagement activities focussing on diversity and inclusion (for example, Workforce management plan, Reconciliation action plan, Disability inclusion action plan)
- Literature review of relevant strategies and plans.

Lessons learned

How did we perform under the previous Integrated Planning and Reporting framework? Did we achieve what we set out to? If not, why? What worked? What could we do better next time?

What is happening now and what we anticipate for the future

An important element of any strategic planning activity is to consider the curent and future operating context. What is happening now and what is expected to happen in the future from a political, economic, social and technological perspective.

Some significant changes have occurred leading up to the development of this framework including the dissolution of Far North Coast County Council and Richmond River County Council. With the operations and functions of those counties transferred to Rous County Council, the timing of the development of this framework offers a unique opportunity to relaunch our reformed organisation.

Other matters informing our Integrated Planning and Reporting framework include: stakeholder interests and concerns; changes arising from the Local Government Amendment (Planning and Governance) Act 2016; the potential future formation of joint organisations of councils; the opportunities to explore and progress regional partnerships and initiatives; Future Water Strategy and supply and demand indicators; compliance with the Best-Practice Management of Water Supply and Sewerage Guidelines (August 2007) and the Australian Drinking Water Guidelines.

Australian Business Excellence framework operating model

The Australian Business Excellence framework is an internationally recognised integrated leadership and management system. It is a performance improvement model based on continuous improvement at all levels with a particular leadership focus on sustainable performance. The framework applies concepts from international best practice leadership models that are applicable to private and public sector organisations. We have used the framework as the foundation of our Integrated Planning and Reporting framework.

Our member council's top priorities as evidenced in their community strategic plans

Ballina

Priorities

- Marina infrastructure
- Health of the Richmond River
- Affordable housing

Priorities that connect us

- Health of the waterways and the Richmond River

Byron

Priorities

- Corporate strategy and integrating Disability inclusion action plan into Integrated Planning and Reporting, streamlining planning with every day functions and service provision, focussing on strong financial sustainability, leveraging of opportunities as they arise.
- Community services improvements, focussing on affordable housing and community infrastructure maintenance through community development services and investment in key community asset and infrastructure.

Priorities that connect us

- Water usage
- Threat to natural environment posed by noxious weeds

Lismore

Priorities

- Affordable housing
- Public transport

Priorities that connect us

- Growth in terms of demand/ supply of water and location (flood free)
- Wilsons River water quality
- Noxious weeds

Richmond Valley

Priorities

- Local employment
- Good roads, parks and open spaces
- Economic development
- Communication and advocacy

Priorities that connect us

- Flood mitigation
- Bushland
- Waterways
- Noxious weeds

Regional, State and Federal strategy

- Australia's First Open Government National Action Plan 2016-18
- Australian Signals Directorate: Strategies to Mitigate Cyber Security Incidents
- Australian Work Health and Safety Strategy 2012–2022
- Biosecurity Strategy 2013-2021
- Far North Coast Regional Strategy 2006-31
- Industry and Investment Corporate plan 2015-2019
- National Local Government Workforce Strategy 2013-2020
- Northern Rivers Invasive Plants Action Strategy 2009-2013 (still current)
- Northern Rivers Regional Plan vision to 2020
- NSW 2021 A Plan to make NSW number one
- NSW Economic Development Framework
- NSW Invasive Species plan 2008-2015 (still current)
- NSW Local Government Workforce Strategy 2016-2020

Consultation

A workshop with council's governing body was held on 15 March 2017 which was an invaluable opportunity to engage with councillors regarding the future direction of the county.

Consultation also occurred with member councils as part of the development of individual service level agreements.

In addition, a public consultation process was undertaken which enabled all interested community members to have input into the Integrated Planning and Reporting framework.

What we stand for

142

Mission: Partner with our constituent councils to provide quality services that support a sustainable and productive region.

Vision: Thrive and evolve as a valued regional service provider.

'Be vigilant and active in identifying risk'

Angela Crimmins

HR Office

'Not just looking out for yourself you are also looking out for the group to provide a quality service'

Rhys Oates

Dams and Treatment Operator

'Respect is a lot of things; respect is listening; respect is caring and respect is acting. If you have respect you get trust'

David Morgan

Construction Labourer

'Doing what I say I am going to do makes me a better employee and more respected'

Kylie Van Der Kolk

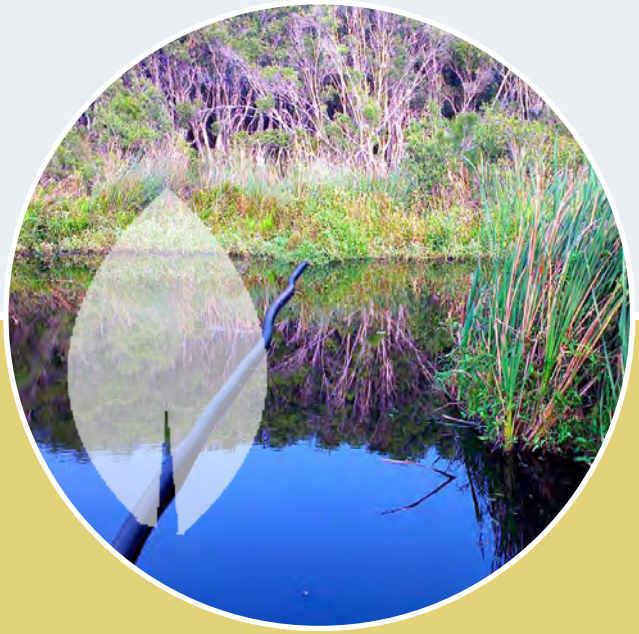
Bush Regeneration and Weed Control Supervisor

2

Resourcing strategy

- Long term financial pla
- Workforce management plan
- Asset management strategy and plan

Long term financial plan



Workforce management plan

Asset management strategy and plan

3

Delivery program | Operational plan

LEADERSHIP

Our goal	1. Values-based leadership and culture.

What achieving our goal will look like	How we will achieve our goal	Delivery				
		2017/18	2018/19	2019/20	2020/21	Group*
1.1 Leaders are visible at all levels of the organisation and are supported to effectively lead and drive performance.	**1.1.1** Enhance management and leadership skills.	Y1	Y2	Y3	**Y4**	PP
1.2 Leaders are responsible for their actions and proactive in building an accountability culture.	**1.2.1** Leaders held to account for their performance.			Y3	**Y4**	PP

What we will do in Y4: 2020/21

Activity	How we will measure our performance	Budget ($)	Links to*	Lead
1.1.1.1 Implement leadership program for the Leadership Team.	Improvement in leadership and management skills (assessed before, during and after undertaking the program).	$	WFMP	GM
1.1.1.2 Leader in Me (LiMe) cohort undertaking activities to drive and support culture transformation.	Current LiMe participants coordinate a specific, self-initiated, whole-of-Rous project that contributes to building a constructive culture, eg. a staff recognition initiative.	$	WFMP	GM
	Breaking down of organisational silos, e.g. LiMe participants selected from different business units; LiMe cohort buddied with LiMe graduates and new cohort; mentoring with Group Manager from a different functional area; LiMe sessions to be held at a variety of Rous locations.	◆	WFMP	GM
	LiMe graduates and new cohort coordinate and lead an all-staff meeting and/or business unit meetings.	$	WFMP	GM
	LiMe cohort delivering regular communications to the workforce about program activities, learnings and outcomes.	◆	WFMP	GM

Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget ($)	Links to*	Lead
1.1.1.2 (continued)	Assess effectiveness of the LiMe program to determine impact and contribution to culture change.	♦	WFMP	HSM
1.1.1.3 Performance planning and management processes include discussion of individual staff member alignment with Council Values.	Individual mission, vision and values discussion held with all staff members at least 6-monthly.	♦	WFMP	HSM
	Record of discussion made by the supervisor and reported to manager upon completion.	♦	WFMP	HSM
1.1.1.4 Participate in the Joint Organisation of Councils as an associate member.	General Manager performing the role of representative on the Natural Resources Management sub-committee and reporting back to the General Manager's group on the sub-committee's operations.	♦	BAU	GM
1.2.1.1 Establish a multi-purpose forum for leaders to connect with each other and operate as a team.	High-performing Leadership Group where members hold each other accountable, monitor performance metrics and work as a team to drive innovation and business improvement.	$	WFMP	GM

*Refer to page 44 for acronym key.

Key contributors/lead agencies:

Stakeholder
Workers

Regulator
Office of Local Government

Interest group
Union organisations

STRATEGY AND PLANNING

Our goal	2. Align strategic direction to core functions and sustainability.

What achieving our goal will look like	How we will achieve our goal	Delivery				Group*
		2017/18	2018/19	2019/20	2020/21	
2.1 Being responsive to the impact of population growth on our core functions.	**2.1.1** Develop new Operational Plan (having regard to the actions outlined in the Delivery Program).	Y1	Y2	Y3		PP
	2.1.2 Develop new Integrated Planning and Reporting framework.				**Y4**	PP
	2.1.3 Continue with key action 2 of the Future Water Strategy (groundwater).	Y1	Y2	Y3		PD
	2.1.4 Subject to non-viability of key action 2, complete key action 3 of the Future Water Strategy (re-use).			Y3		PD
	2.1.5 Determine a position regarding the Future Water Strategy update (following completion of key actions).			Y3	**Y4**	PD
2.2 Strategic partnerships/ relationships supportive of our mission and vision.	**2.2.1** Partner with stakeholders to facilitate implementation of the Coastal Zone Management Plan for the Richmond River catchment.	Y1	Y2	Y3	**Y4**	PD
	2.2.2 Partner with stakeholders for the ongoing development of Flood Management Plans for the Richmond River catchment.	Y1	Y2			PD
	2.2.3 Understand and evaluate our role as the Flood Mitigation Authority with each of our constituent councils within the Richmond River catchment.				**Y4**	PD
2.3 Business activity contributes to local and regional growth and optimal environmental outcomes.	**2.3.1** Implement Reconciliation Action Plan.	Y1	Y2	Y3	**Y4**	CC
	2.3.2 Develop new Reconciliation Action Plan (informed by the Reconciliation Action Plan Advisory Group) that is endorsed by Reconciliation Australia.		Y2		**Y4**	CC
	2.3.3 Develop a strategy to reduce greenhouse gas emissions.	Y1				PD
	2.3.4 Implement greenhouse gas abatement strategy.		Y2	Y3	**Y4**	PD
	2.3.5 Implement enhanced Demand Management Plan.	Y1	Y2	Y3	**Y4**	PD
	2.3.6 Review effectiveness of energy efficiency measures (Administration building).		Y2			CC
	2.3.7 Review options pre-release Stage 7 of the Perradenya Estate, related to satisfaction of conditions (water reclamation and integrated allotments).				**Y4**	CC

*Refer to page 44 for acronym key.

What achieving our goal will look like	How we will achieve our goal	Delivery				
		2017/18	2018/19	2019/20	2020/21	Group*
2.4 Converting strategy into action plans that anticipate and accommodate change and allocate accountability.	**2.4.1** Review Capital Works Plan (major review).	Y1			**Y4**	PD
	2.4.2 Implement Capital Works Plan.	Y1	Y2	Y3	**Y4**	PD
	2.4.3 Implement Disability Inclusion Action Plan.	Y1	Y2	Y3	**Y4**	PD
	2.4.4 Review Disability Inclusion Action Plan.				**Y4**	PP
	2.4.5 Review the Drinking Water Management System.	Y1				PD
	2.4.6 Complete operational readiness actions as identified in the Drought Management Plan	Y1	Y2	Y3	**Y4**	PD
	2.4.7 Assess physical security review audit results and develop implementation plan.	Y1	Y2	Y3	**Y4**	CC
	2.4.8 Implement physical security review improvements.	Y1	Y2	Y3		PD
	2.4.9 Establish and embed a consistent and integrated approach to workforce planning.	Y1	Y2	Y3	**Y4**	PP
	2.4.10 Implementation of advanced asset management planning.	Y1	Y2	Y3	**Y4**	PD
	2.4.11 Develop IT Strategic Plan.	Y1			**Y4**	CC
	2.4.12 Staged implementation of IT Strategic Plan.		Y2	Y3		CC
	2.4.13 Staged implementation of Catchment Management activities.	Y1	Y2	Y3	**Y4**	PD
	2.4.14 Implement Rous County Council activities as outlined in the Coastal Zone Management Plan for the Richmond River catchment.	Y1	Y2	Y3	**Y4**	PD
	2.4.15 Develop a corporate properties management plan (proposed Dunoon Dam, operational and commercial properties).		Y2	Y3		CC
	2.4.16 Service level agreement negotiation for exercise of 2-year option (Tweed Shire Council).		Y2			OP
	2.4.17 Service level agreements revised and new agreements in place (constituent councils).			Y3	**Y4**	OP
	2.4.18 Develop Richmond Water Laboratories strategic business options paper.		Y2			CC
	2.4.19 Develop Catchment Management Plans for all council water sources (excluding groundwater).			Y3		PD
	2.4.20 Review the Drought Management Plan.				**Y4**	PD
	2.4.21 Service level agreement revised and new agreement in place (Kyogle Council).				**Y4**	OP
	2.4.22 Develop new Audit Risk and Improvement Committee internal audit strategy.		Y2			PP
	2.4.23 Develop Strategic Plan for targeted flood mitigation research and grants	Y1		Y3		PD
	2.4.24 Implement a targeted weed eradication and control plan.		Y2	Y3	**Y4**	OP
	2.4.25 Develop and implement Procurement, Properties and Fleet Business Plan.			Y3	**Y4**	CC
	2.4.26 Implementation of Maintenance Management Strategy improvement actions.				**Y4**	PD

*Refer to page 44 for acronym key.

What we will do in Y4: 2020/21

Activity	How we will measure our performance	Budget $	Links to*	Lead
2.1.2.1 Develop new Integrated Planning and Reporting framework.	Integrated Planning and Reporting framework adopted (including Resourcing Strategy consisting of Asset Management strategy and plan, Long term financial plan and Workforce Management plan.	$	AMP; LTFP; WFMP	GMPP
2.1.5.1 Update on progress of the Future Water Strategy.	Develop and implement a plan for community re-engagement and communication.	$	FWS	PM
2.1.5.2 Finalise the position regarding the Future Water Strategy update (following consultation on the draft Future Water Strategy update).	Complete the Integrated Water Cycle Management process for the Future Water Strategy update and develop a source water augmentation delivery plan.	$	FWS	FWSPM
2.1.5.3 Implement the source water augmentation delivery plan.	Implement key actions from the source water augmentation delivery plan.	$	FWS	FWSPM
2.1.5.4 Undertake hydraulic capacity assessment of water distribution network to develop augmentation capital works plan.	Hydraulic capapcity assessment completed and works plan included in 30-year capital works plan.	$	AMP	SPE
2.2.1.1 Progress implementation of the Coastal Zone Management Plan for the Richmond River catchment through the Coastal Zone Management Plan Implementation Committee.	Facilitate meetings of the Coastal Zone Management Plan Implementation Committee.	$	CZMP	NRMPC
2.2.3.1 Understand and evaluate our role as the Flood Mitigation Authority with each of our constituent councils within the Richmond River catchment	Undertake individual workshops with senior staff and management of Lismore City, Ballina Shire and Richmond Valley councils.	◆	BAU	PLM
	Outcomes of workshop considered within proclamation context, Long Term Financial Plan implications and Council position.	◆	BAU	PLM
2.3.1.1 Implement Reconciliation Action Plan.	Actions for 2020/21 completed.	$	RAP	GMCC
2.3.1.2 Complete the Reconciliation Action Plan Impact Measurement Report.	Report to Reconciliation Australia annually on performance against key Reconciliation Action Plan targets to track and measure the broader impact of the Reconciliation Action Plan program.	$	RAP	GMCC
2.3.2.1 Develop a new Reconciliation Action Plan.	Reconciliation Action Plan endorsed by Reconciliation Australia.	$	RAP	GMCC
2.3.4.1 Implement Greenhouse Gas Abatement Strategy.	Provide a status report to Council on the progress of implementation of the Greenhouse Gas Abatement Strategy.	◆	GGAS	DM
2.3.5.1 Enhanced Demand Management Plan actions.	Provide an end of year performance report to Council on the progress of the implementation of the Regional Demand Management Plan.	$	DMP	SPE
	Actively promote the Sustainable Water Partnership Program to targeted customers.	$	DMP	SPE
	Implement 3 water saving projects identified in the water saving plans.	$	DMP	SPE

*Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
2.3.5.1 Continued.	Partner with constituent councils in the development of regional demand management promotional material.	$	DMP	SPE
	Process all residential rainwater tank rebates within agreed timeframe, aiming for 65 rebates per annum.	$	DMP	SPE
	Develop and implement a communication and engagement program targeting high residential water users, to support the 160 Litre Challenge.	$	DMP	SPE
	Develop online home water audit tool, to support the 160 Litre Challenge.	$	DMP	SPE
2.3.7.1 Strategic review of options for integrated lots and water reclamation at Perradenya.	Outcome of review reported to Council.	$	LTFP	GMCC
2.4.1.1 Review of Capital Works Plan.	Plan reviewed inconjunction with the development of the new Integrated Planning and Reporting framework (in particular the Asset management stratgey and plan).	$	AMP	APE
2.4.2.1 Implement Capital Works Plan.	Project Management Framework monthly reports completed on time (within 10 days of the end of the calendar month).	◆	BAU	GM
	Key project delivered: Stage 1 - St Helena 600 pipeline.	$	CWP	DM
	Key project: Stage 2 - St Helena 600 pipeline (contract awarded and construction commenced).	$	CWP	DM
	Key project delivered: Nightcap raw water pump upgrade.	$	CWP	DM
	Key project: Perradenya Release 7 (construction contract awarded).	$	CWP	GMCC
	Key project: Rocky Creek Dam aerator upgrade completed.	$	CWP	DM
	Key project: Grace Road reticulation renewal completed.	$	CWP	DM
2.4.3.1 Implement Disability Inclusion Action Plan.	Actions for 2020/21 completed.	$	AMP; LTFP; WFMP	GMPP
2.4.4.1 Review Disability Inclusion Action Plan.	Plan reviewed inconjunction with the development of the new Integrated Planning and Reporting framework.	$	AMP; LTFP; WFMP	GMPP
2.4.6.1 Complete Rous' operational readiness actions as identified in the Drought Management Plan	Review and finalise drought management plan templates, guidelines and resources for non-residential customers.	$	DMP	PLM
	Prepare a funding submission for Constituent Council consideration for a future temporary staff member within Rous County Council to manage water restrictions and exemption enquiries consistently.	◆	DMP	PLM
	Review and update Drought Management Plan - adopted in August 2016.	◆	DMP	PLM

*Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
2.4.7.1 Finalise implementation plan and determine priority and budget impact.	Report to the Leadership Team and Council (if required) through Quarterly Budget Review Statement process.	◆	AMS	PPC
2.4.9.1 Workforce planning sessions with Leadership Team (for forecasting, assessment, challenge and review, monitoring and succession planning).	Two workforce planning sessions per annum (including review of succession plan and business critical roles).	◆	WFMP	HSM
	Biannual workforce report to Leadership Team.	◆	WFMP	HSM
2.4.10.1 Develop revised levels of service and maintenance requirements in consultation with constituent councils based on a review of asset ownership and responsibilities, risk management, asset condition, maintenance, inspection and natural resource management requirements.	Draft of revised service levels and maintenance requirements prepared in advance of future changes to Service Level Agreements.	◆	AMP	GMO
2.4.10.2 Determine renewal requirements for flood mitigation assets.	Review and update Capital Works Plan for flood mitigation assets, following preparation of documented process for asset assessment (to be completed following 2.4.10.6).	◆	AMP	APE
2.4.10.3 Review and formal adoption of Asset Management strategic documents.	Adoption by LT of Asset Management Policy, Asset Management Strategy, Asset management Plan and Maintenance Management Strategy.	◆	AMP	ASG
2.4.10.4 Develop and document process for asset management reporting.	Process developed and reporting underway.	◆	AMP	ASG
2.4.10.5 Develop and document processes for the Asset Management System.	An electronic aset management manual accessible to all staff developed with links to processes added as developed.	◆	AMP	ASG
2.4.10.6 Undertake strategic review of Nightcap Water Treatment Plant to develop 20-year master plan of renewals and upgrades.	Strategic Review of Nightcap Water Treatment Plant completed, documented and reported to the Leadership Team.	$	AMP	SPE
2.4.11.1 Develop IT Strategic Plan 2021-25.	Adopted by Leadership Team.	$	ICT SP	ICTM
2.4.13.1 Council owned areas of buffer zones/ catchment lands are managed to meet identified objectives for water quality management purposes through ongoing maintenance effort.	Work progresses on Council owned buffer zone lands in line with the Maintenance Management Plan, as evidenced by end of year status report.	$	BRMMP	WBBRM
2.4.13.2 Prepare Rocky Creek Dam (including Whian Whian Falls) multi-year Master Plan.	Master Plan complete and endorsed by Council, including a community values-based assessment of Rocky Creek Dam.	$	AMS	SPE
2.4.13.3 Complete bush regeneration follow-up works on Wilsons River landowner sites and renew landholder agreements to establish a target date of 30 June 2021 for handing over ongoing maintenance.	Achieved.	$	AMS	NRMPC
2.4.13.4 Complete an external audit report on Catchment Management Plan implementation and prepare a 5-year delivery plan.	Achieved.	$	DWMS	NRMPC

Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
2.4.13.5 Year 1 actions from 5-year Catchment Management Plan Implementation Delivery Plan.	Implement catchment education and awareness activities aimed at rural land use, on-site sewage management and stormwater management issues.	$	DWMS	NRMPC
	Expand 6-monthly pesticide screening to include high risk chemicals.	$	DWMS	NRMPC
	Assess progress/current condition of Wilsons River River Reach Plan areas and scope/plan additional work for subsequent delivery period.	$	DWMS	NRMPC
	Assess progress/current condition of Emigrant Creek River Reach Plan areas and scope/plan additional work for subsequent delivery period.	$	DWMS	NRMPC
2.4.14.1 Develop floodgate management plans/protocols for Rous County Council's critical infrastructure sites as identified in the Rous County Council service level agreements (CZMP 4b).	100% of active floodgate management plans reviewed and current.	◆	CZMP	FEO
	Training and active management of all section 355 committee members.	◆	CZMP	FEO
2.4.14.2 Rehabilitate very high/high priority riparian restoration sites (CZMP 6a).	Implement riparian improvement works on 1 ha.	$	CZMP	NRMPC
2.4.14.3 Proceed to commence development of a Coastal Management Program (CMP) for the Richmond River estuary.	Stage 1: Scoping study completed.	$	CZMP	NRMPC
2.4.17.1 Service level agreements revised and new agreements in place (consituent councils).	Agreements finalised and signed o f.	◆	BAU	GM
2.4.20.1 Review Drought Management Plan.	Drought Management Plan reviewed and updated in consultation with constituent councils.	$	DMP	WSO
2.4.21.1 Service level agreement revised and new agreement in place (Kyogle Council).	Agreement finalised and signed o f.	◆	BAU	GMO
2.4.24.1 Implement a targeted weed eradication and control plan.	Annual review, update, and implement a localised (Rous County Council local government area) weed control plan for reprioritisation of effort to achieve greatest return on investment in line with Regional and State priorities.	◆	Regional priorities	WBBRM
2.4.25.1 Implementation of Procurement, Properties and Fleet Business Plan.	Progress reports to Leadership Team regarding implementation of priorities identified in Business Plan	◆	BAU	PPC
2.4.26.1 Implement maintenance planning improvement actions.	Maintenance activities not captured within Confirm identifie and management process developed.	◆	AMS/MMS	ASG
	Critical and non-critical maintenance identified with management process within Confirm	◆	AMS/MMS	ASG
	Defect capture within Confirm improved to include failure modes.	◆	AMS/MMS	ASG

*Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
2.4.26.1 Continued.	Options for improved maintenance cost capture investigated.		AMS/MMS	ASG
	Agreed timeframes for attending to service requests and defects reviewed and documented.		AMS/MMS	OEM
	Condition assessment program for asset classes developed.		AMS/MMS	OEM
	Review of planned maintenance activities for asset classes completed.		AMS/MMS	DTEM

*Refer to page 44 for acronym key.

Key contributors/lead agencies:

Stakeholder
Aboriginal groups
Community
Disability service providers
Landholders and the floodplain communit
Member councils
Roads and Maritime Services
Workers

Interest group
Australian Government, Department of Communications and the Arts
Chamber of Commerce
Computer Emergency Response Team Australia
CZMP Implementation Committee
NSW Department of Industry - Lands
Northern Rivers Regional Organisation of Councils
Tourism operators
Universities and research institutions

Regulator
Australian Government, Department of Defence Australian Signals Directorate
Australian Government, Department of the Environment and Energy
Independent Commission Against Corruption
Lismore City Council
NSW Audit Offic
NSW Department of Primary Industries
NSW Health
NSW National Parks and Wildlife Service
NSW Office of Environment and Heritag
NSW Office of ater
NSW Ombudsman
Office of Local Governmen
Office of the Information Commissione
Office of the Privacy Commissione


ROUS
COUNTY COUNCIL

INFORMATION AND KNOWLEDGE

Our goal	3. Create value through applying knowledge.

What achieving our goal will look like	How we will achieve our goal	Delivery 2017/18	2018/19	2019/20	2020/21	Group*
3.1 We will better utilise the knowledge and expertise of our people and the knowledge embedded in our organisational systems to inform decision-making and enhance transparency, business continuity and resilience.	**3.1.1** Optimise current information management systems and processes.	Y1	Y2	Y3	**Y4**	CC / PP / OP/PD
	3.1.2 Review and update the Emergency Response Plans.	Y1	Y2	Y3	**Y4**	OP
	3.1.3 Minimise risks and optimise efficiencies	Y1	Y2	Y3	**Y4**	CC / PP / OP/PD
	3.1.4 Maximise the full potential of our workforce.	Y1	Y2	Y3	**Y4**	PP
	3.1.5 Encourage transparency and an effective risk culture across Council.		Y2	Y3	**Y4**	PP
	3.1.6 Continually review Council's policies and procedures for suitability and currency.		Y2	Y3	**Y4**	PP
	3.1.7 Develop and implement a compliance and enforcement framework.		Y2	Y3		PP

What we will do in Y4: 2020/21

Activity	How we will measure our performance	Budget $	Links to*	Lead
3.1.1.1 Develop strategies and actions to manage and optimise use of GIS and Asset Information.	Strategy finalised with identified improvement action	◆	AMS	ASG
3.1.2.1 Review the Emergency Management Manual, including Emergency Response Plans and supporting appendices to ensure currency.	Achieved.	◆	ERP	GMO
3.1.3.3 Perform security-focused external review of a key Information Technology system.	Results reported to Leadership Team (including actions arising).	$	BAU	ICTM

Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
3.1.4.1 Identify and provide opportunities for employees to temporarily transfer to other positions in the organisation.	Arrangements for employees to relieve in temporarily vacant positions (including pending the permanent filling of a position, staff absences of >4 weeks and project-based work) are considered prior to a decision to externally recruit or a decision not to backfill	◆	BAU	HSM
3.1.5.1 Develop a Risk and Assurance Strategy and implementation plan.	Draft reported to the Leadership Team by 30 November 2020 and endorsed by the Audit Risk and Improvement Committee by its first meeting in 2021	◆	BAU	RISC
	Quarterly report to the Leadership Team on progress against achievement of implementation plan.	◆	BAU	RISC
	Evidence of regular and formalised risk and assurance performance monitoring and review, and risk mapping and scanning activities, engaging all levels of the business.	◆	BAU	RISC
3.1.5.2 Implementation of electronic incident reporting and management (Vault).	Paper based event reporting and management phased out and replaced with Vault event reporting and management by 30 June 2021.	◆	WHSMS	RISC
3.1.6.1 Review of policies and procedures for suitability and currency.	Progress reporting on status of policies and procedures to Audit, Risk and Improvement Committee.	◆	BAU	GO

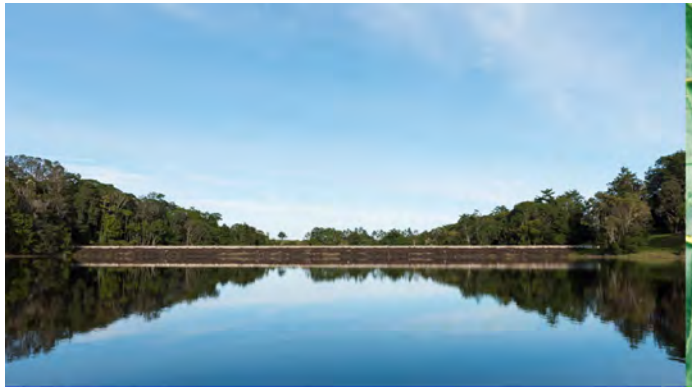
Refer to page 44 for acronym key.

Key contributors/lead agencies:

Stakeholder
Community
Workers

Regulator
SafeWork NSW

Interest group
Emergency Services
Insurers
Member councils
Safe Work Australia



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PEOPLE

Our goal	4. Organisational capability through our people.

What achieving our goal will look like	How we will achieve our goal	Delivery				Group*
		2017/18	2018/19	2019/20	2020/21	
4.1 A high performing team enriched through diversity.	**4.1.1** Measure and improve employee engagement.	Y1	Y2	Y3	**Y4**	PP
	4.1.2 Invest in employee skill development.	Y1	Y2	Y3	**Y4**	PP
	4.1.3 Build and attract a diverse workforce.	Y1	Y2		**Y4**	PP
4.2 A workplace where safety and wellbeing come first	**4.2.1** Implement the Work Health and Safety Management System.	Y1	Y2	Y3	**Y4**	PP
	4.2.2 External implementation audit of Work Health and Safety Management System.		Y2			PP
	4.2.3 Review and update Work Health and Safety Management System.			Y3	**Y4**	PP

What we will do in Y4: 2020/21

Activity	How we will measure our performance	Budget $	Links to*	Lead
4.1.1.1 Conduct employee surveys.	Improvement initiatives/actions identified in intial (culture) survey achieved.	$	WFMP	HSM
	Engagement survey conducted and measured against initial (culture) survey.	$	WFMP	HSM
	Monthly employee communications using a variety of channels.	◆	WFMP	HSM
4.1.2.1 Identify and provide opportunities for employees to acquire a wider skill set.	Performance review process incorporates employee skills development through informal professional development and training opportunities.	◆	BAU	HSM
4.1.3.1 Develop a promotional video for Employee Value Proposition and organisation (overall).	Video available on website and linked to all job adverts.	$	WFMP	HSM
	Digital analytics showing number of views and number of links to video clicked.	$	WFMP	HSM
4.2.1.1 WHS management reporting.	Officers (Leadership Team) informed of WHS performance and accountable for continuous improvement in workplace safety.	◆	WHSMS	RISC
	Wellbeing program implemented and outcomes reported to Leadership Team.	◆	WHSMS	HSM

*Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
4.2.1.2 Employee participation in in-house WHS training activities and national safe work month (October).	Program of safety, health and well-being related awareness-raising activities undertaken.	$	WHSMS	RISC
	All allocated SafetyHub training completed.	$	WHSMS	RISC
	More than 50% of workforce actively participate in a national safe work month activity.	$	WHSMS	RISC
4.2.3.1 Progress action plan following WHS internal audit.	Actions prioritised and progress against implementation reported to the Audit, Risk and Improvement Committee.	◆	BAU / WHSMS	RISC
	Work Health and Safety Management System reviewed and updated.	◆	BAU / WHSMS	RISC

*Refer to page 44 for acronym key.

Key contributors/lead agencies:

Stakeholder	Regulator	Interest group
Community	Insurance and Care NSW	Insurers
Workers and their families	Office of Local Governmen	Safe Work Australia
	SafeWork NSW	Union organisations
	State Insurance Regulatory Authority	

CUSTOMERS AND STAKEHOLDERS

Our goal	**5.** Proactive management of relationships with member councils and key stakeholders.

What achieving our goal will look like	How we will achieve our goal	Delivery				Group*
		2017/18	2018/19	2019/20	2020/21	
5.1 Mutual understanding of needs, priorities, expectations, functions, operations, service standards, span of control and influence	**5.1.1** Document processes for effectively managing customer and other stakeholder relationships.	Y1		Y3	**Y4**	PP
	5.1.2 Participation in Performance Audits undertaken by the NSW Audit Office	Y1	Y2	Y3	**Y4**	CC
5.2 Build and attract a diverse workforce.	**5.2.1** Business process and service standards that complement Council's Employee Value Proposition.	Y1	Y2	Y3	**Y4**	PP

What we will do in Y4: 2020/21

Activity	How we will measure our performance	Budget $	Links to*	Lead
5.1.1.1 Provide regular flow of information to key stakeholders promoting Council activity and raising brand value and awareness.	Active social media streams.	$	CESP	CEC
	Regular review of the function and effectiveness of feedback mechanisms.	◆	CESP	CEC
	Active events calendar to identify appropriate events for stakeholder engagement.	◆	CESP	CEC
5.1.1.2 Assess the effectiveness of the Customer Service Team trial and report recommendations to the Leadership Team.	Final position determined on the Customer Service Team and operation, including performance measures.	$	WMFP	GMCC
5.1.2.1 Participation in NSW Audit Office performance audit reviews.	Achieved.	◆	CSP	FM

Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
5.2.1.1 Establish service standards for key business processes to optimise attraction and retention.	Vacancies are filled within 90 business days of approval to recruit.	◆	WFMP	HSM
	Less than or equal to 5% turnover for new employees within first 18 months post probation	◆	WFMP	HSM
	Recruitment and selection activities promote and comply with Equal Employment Opportunity principles.	◆	WFMP	HSM
	As measured through employee pulse surveys, at least 90% of new employees are satisfied with the induction process	◆	WFMP	HSM

*Refer to page 44 for acronym key.

Key contributors/lead agencies:

Stakeholder	Regulator	Interest group
Community	NSW Audit Offic	Northern Rivers Regional Organisation of Councils
Landholders and the floodplain communit	Office of Local Governmen	
Member councils		
Retail customers		
Service level agreement customers		

PROCESS MANAGEMENT, IMPROVEMENT AND INNOVATION

Our goal	6. Continuous improvement through process management and innovative thinking.

What achieving our goal will look like	How we will achieve our goal	Delivery 2017/18	2018/19	2019/20	2020/21	Group*
6.1 Recognising and being open to opportunities for improvement through innovation.	**6.1.1** Implement an end-to-end agenda and minute technology solution.				**Y4**	GM
	6.1.2 Staged digitisation of paper records.		Y2	Y3		CC
	6.1.3 Review the relevancy of tests, limits and matrices in reference to customer service level agreements (Richmond Water Laboratories).	Y1	Y2		**Y4**	CC
	6.1.4 Determine appropriate NATA accreditation (Richmond Water Laboratories).	Y1	Y2		**Y4**	CC
	6.1.5 Develop a new competency framework.			Y3		PP
	6.1.6 Review procurement process and systems.			Y3		CC
	6.1.7 Develop business case for any proposed non-core business activity to inform decision on whether to proceed with the activity/project.	Y1	Y2	Y3		CC / PP / OP / PD
	6.1.8 Create a performance culture linked to turnaround times for key business processes.	Y1	Y2	Y3	**Y4**	CC / PP / OP / PD
	6.1.9 Optimise efficiencies in people management processes		Y2	Y3	**Y4**	CC / PP
	6.1.10 Audit administration of the Development Servicing Plan for Bulk Water Supply.		Y2			CC
	6.1.11 Implementation of ICT Business Plan 2019-21.				**Y4**	CC

What we will do in Y4: 2020/21

Activity	How we will measure our performance	Budget $	Links to*	Lead
6.1.1.1 Implement electronic Business Paper Agenda and Minute system.	Technology solution implementation phase commenced.	$	BAU	GM
6.1.3.1 Review scope for Richmond Water Laboratories equipment renewal or purchase, layout changes.	By 30 June 2020.	♦	BAU	RWLM

Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
6.1.4.1 Review Richmond Water Laboratories NATA accreditation and determine business requirements.	All NATA accredited tests reviewed.	♦	BAU	RWLM
6.1.8.1 Review and document Customer Service processes.	Implementation of endorsed recommendations from the Customer Service review.	$	BAU	GMCC
6.1.8.2 Review and redefine People and Performance Group business processes.	Streamline internal business processes and reduce red tape across functional areas (focus area - Risk and Compliance, and Governance).	♦	BAU	GMPP
6.1.9.1 Implement Human Resources Information Management System (end to end technology solution) to reduce risk and optimise efficiencies	Technology solution implementation phase commenced.	$	WFMP	HSM
6.1.11.1 Implement ICT Team action 1 - Well-defined and articulated operating model.	6-monthly status reports to LT.	♦	BAU	CC
6.1.11.2 Implement ICT Team action 2 - Clearly established 'Business as Usual' requirements.	6-monthly status reports to LT.	♦	BAU	CC
6.1.11.3 Implement Corporate action 3 - Content Manager.	Technology solution implementation phase commenced.	$	BAU	CC
6.1.11.4 Implement Corporate action 4 - CRM.	Technology solution implementation phase commenced.	$	BAU	CC
6.1.11.5 Implement Corporate action 5 - GIS Improvement Program.	Adopted improvement program by LT.	$	BAU	PD
6.1.11.6 Implement Corporate action 6 - Asset Information Management System Improvement Program.	Adopted improvement program by LT.	$	BAU	PD
6.1.11.7 Implement Corporate action 10 - Project Management System.	Technology solution implementation phase commenced.	$	BAU	GM

Refer to page 44 for acronym key.

Key contributors/lead agencies:

Stakeholder
Community
Member councils
Members of the governing body
Retail water customers
Workers

Regulator
National Association of Testing Authorities

Interest group
Aboriginal groups
Chamber of Commerce
Disability service providers
Union organisations

RESULTS AND SUSTAINABLE PERFORMANCE

Our goal	**7.** Sustainable performance.

What achieving our goal will look like	How we will achieve our goal	Delivery 2017/18	2018/19	2019/20	2020/21	Group*
7.1 We are recognised as a valued regional service provider and reliable cost effective deliverer of our core functions and operations.	**7.1.1** Deliver functions and operations according to service level agreements in place.	Y1	Y2	Y3	**Y4**	OP
	7.1.2 Achieve or exceed financial budget forecast in net profit (Richmond ater Laboratories).	Y1	Y2	Y3	**Y4**	CC
	7.1.3 Deliver services according to service contracts in place (Richmond Water Laboratories).	Y1	Y2	Y3	**Y4**	CC
	7.1.4 Release Stage 5 (release 2) of the Perradenya Estate (construction and sale).	Y1	Y2			CC
	7.1.5 Release Stage 6 of the Perradenya Estate.			Y3	**Y4**	CC
7.2 Levels of service align with agreed priorities, financial and asset capability and long-term financial plans	**7.2.1** Water quality monitoring.	Y1	Y2	Y3	**Y4**	OP
	7.2.2 Monitor and report on actions to mitigate risk of environmental harm from activities (environmental action list).	Y1	Y2	Y3	**Y4**	PD
	7.2.3 Review water charges having regard to relevant best practice industry guidelines for non-metropolitan water utilities.		Y2			CC

What we will do in Y4: 2020/21

Activity	How we will measure our performance	Budget $	Links to*	Lead
7.1.1.1 Performance report issued to Service Level Agreement parties in relation to delivery of services subject to the agreement.	Copy of performance report issued with Delivery Program report.	♦	DP	GMO
7.1.1.2 Performance report issued to councillors in relation to delivery of services subject to Service Level Agreements as part of communications with general managers.	Copy of performance report issued with Delivery Program report.	♦	DP	GMO

Refer to page 44 for acronym key.

Activity	How we will measure our performance	Budget $	Links to*	Lead
7.1.1.3 Identfied bu fer zone areas that are privately owned or on school land reach 'maintenance standard', and are handed back to their owners.	Work has been carried out to bring affected land to the required standard and buffer zone areas are handed back to landowners for ongoing management.	$	BRMMP	NRMPC
7.1.1.4 Install an active floodgate in Swan Bay to manage nutrient build up.	Long-term solution implemented for weed reduction in Swan Bay.	$	DP	GMO
7.1.1.5 Dam Safety Management System implemented and ongoing reviews and annual report conducted.	Annual report and gap analysis completed for compliance with new *Dam Safety Act 2015*.	$	DP	DTEM
7.1.2.1 Achieve or exceed adopted financial budget forecast in net profit (Richmond ater Laboratories).	Achieved.	◆	LTFP	RWLM
7.1.3.1 Deliver services according to service contracts in place (Richmond Water Laboratories).	Achieved.	◆	RWLSP	RWLM
7.1.5.1 Continue to progress design, cost and construction of Perradenya cycle path in negotiation with Lismore City Council.	Construction budget, timetable and way forward considered by Council.	$	BASP	GMCC
7.2.1.1 Water quality monitoring report card for drinking water supply monitoring programs.	Report card produced and provided to NSW Health.	◆	DWMS	GMO
7.2.2.1 Report on progress of actions to mitigate risk of environmental hard from activites (environmental action list).	Provide an update report to Council until actions on the action list are closed out.	◆	BAU	APE

*Refer to page 44 for acronym key.

Key contributors/lead agencies:

Stakeholder

Community

Developers

Local government service level agreement parties

Member councils

NSW Land and Property Information

NSW North Coast Weeds Advisory Committee

Regulator

Australian Government, Department of the Environment and Energy

Lismore City Council

Local Land Services

NSW Audit Offic

NSW Department of Primary Industries

NSW Health

NSW Office of Environment and Heritag

NSW Office of ater

Office of Local Governmen

Interest group

Financial institutions

Queensland government

Reserve Bank of Australia

Special medical groups (hospitals, nursing homes, etc.)

The Water Directorate

Delivery program 2017/18-2020/21
Operational plan 2020/21

Acronym key:

◆	Activity involves staff time and consumable type costs funded through existing operating/recurrent allocations.
$	Activity has a budget allocation.
AMS	Asset management strategy and plan
BAU	Business as usual
BASP	Business activity strategic plan
BRMMP	Bush Regeneration Maintenance Management Plan
CC	Corporate and Commercial Group
CESP	Communications and Engagement Strategic Plan
CSP	Client service plan
CZMP	Coastal zone management plan
DIAP	Disability inclusion action plan
DMP	Demand management plan
DWMS	Drinking water management system
ERP	Emergency response plan
FMRSP	Flood mitigation and research strategic plan
FWS	Future water strategy
GGAS	Greenhouse gas abatement strategy
ITSP	IT strategic plan
LTFP	Long term financial plan
MMS	Maintenance Management Strategy
OP	Operations Branch
PD	Planning and Delivery Branch
PP	People and Performance Group
RAP	Reconciliation action plan
RWLSP	Richmond Water Laboratories strategic plan
SLA	Service level agreements (member council and other councils)
WFMP	Workforce management plan

APE	Asset Planning Engineer
ASG	Asset System and GIS Development Office
CEC	Communications and Engagement Coordinator
DM	Delivery Manager
DTEM	Dams and Treatment Engineering Manager
FEO	Floodplain Engagement Officer
FM	Finance Manager
FWSPM	Future Water Strategy Project Manager
GM	General Manager
GMCC	Group Manager Corporate and Commercial
GMO	Group Manager Operations
GMPP	Group Manager People and Performance
GO	Governance Office
HSM	Human Services Manager
ICTM	Information and Communications Technology Manager
NRMPC	Natural Resource Management Planning Coordinator
OEM	Operations Engineering Manager
PLM	Planning Manager
PM	Project Manager
PPC	Procurement and Properties Coordinator
RISC	Risk and Compliance Coordinator
RWLM	Richmond Water Laboratories Manager
SPE	Strategic Planning Engineer
WBBRM	Weed Biosecurity and Bush Regeneration Manager
WSO	Water Sustainability Office

Statement of Revenue Policy – 2020/21

This Policy details the basis for the determination of member council contributions and other relevant revenue streams that inform Council's financial plans. It is designed to ensure funding is available to maintain agreed levels of service and to provide adequate financial capacity for planned capital works and therefore sustainability of services for the region.

This Policy forms part of Council's long term financi l plan, which requires a balance of funds from existing operations, established restricted cash assets, and new sources of revenue including loan funds for those assets required due to growth.

Income
Bulk water

Bulk water sales revenue from member councils and direct retail customers, is calculated on the gross dollar yield required to fund bulk water supply activities. For 2020/21, the gross dollar yield is $19,827,600, which is an increase of $1,297,100 (7.0%) on the previous year.

Supply Area	Proportional Weighting	2020/21 $
Lismore City Council	27.44%	5,441,400
Byron Shire Council	22.59%	4,479,300
Richmond Valley Council	5.85%	1,159,100
Ballina Shire Council	34.52%	6,843,500
Rous County Council Direct Retail	9.60%	1,904,300
	100.00%	**19,827,600**

Member councils' contribution of required revenue is calculated based on prior year consumption.

In 2020/21 the notional price per kilolitre of water charged to member councils and Council's Retail Water Fund is $1.72 per kilolitre.

Retail customers

In accordance with Independent Pricing and Regulatory Tribunal (IPART) and NSW State Government's 'Best Practice Management of Water and Sewage Guidelines', Council applies the principle of two-part tariff with quarterly meter reading and billing.

For 2020/21, the price per kilolitre will increase by 4% in line with the long term financia plan to $2.53 per kilolitre. Fixed fee facility charges will also increase by 4%.

Development servicing plan

Section 64 of the *Local Government Act 1993* allows Council to levy developers with a contribution charge to provide a source of funds devoted to the augmentation program resulting from increased demand.

The Development Servicing Plan for Bulk Water Supply 2016 was adopted by Council at its June 2016 meeting, effective 1 July 2016. The plan is in accordance with the 'best practice' guidelines as issued by the NSW Office of Water.

For 2020/21, in accordance with the plan, the charge increases by $139 (1.6%) to $8,872 per Equivalent Tenement.

Weed biosecurity

Council levies assessments on member Councils based on the following formula, which was adopted in 1994 and confirmed by review in 2003 and 2004. The formula is on the basis of 50% Part A and 50% Part B:

Part A: area % + length of roads % + number of rural holdings % + population %.

Part B: number of property inspections % + weed control costs %.

Since July 2013 the contribution weighting has been fixed with the contribution amount increased annually by the rate peg percentage which is determined annually by IPART.

Effective 1 July 2016 services for Kyogle and Tweed councils are now provided under a service level agreement. Their fee is based on the same contribution calculation.

For 2020/21, contributions will increase by rate pegging, which is 2.6%. Amounts listed are exclusive of GST.

Service Area	2020/21 $
Ballina Shire Council	115,500
Byron Shire Council	115,500
Lismore City Council	151,800
Richmond Valley Council	125,600
*Kyogle Council**	*126,700*
*Tweed Shire Council**	*173,900*
	809,000

**Service level agreement.*

Council regularly attracts government funding for weed biosecurity. Council considers grant-funding matching requirements on a case by case basis.

Flood mitigation

Council levies assessments on member Councils based on an even portion of gross revenue.

For 2020/21, contributions will increase by the rate peg, which is 2.6%. Amounts listed below are exclusive of GST.

Service Area - flood mitigatio	2020/21 $
Ballina Shire Council	219,400
Lismore City Council	219,400
Richmond Valley Council	219,400
	658,200

Ex-drainage union

Council levies assessments on member Councils for works undertaken on ex- drainage union assets, based on the existing contribution amounts, increased annually by the rate peg percentage which is determined annually by IPART.

For 2020/21, contributions will increase by the rate peg, which is 2.6%. Amounts listed below are exclusive of GST.

Service Area - Ex-drainage union	2020/21 $
Ballina Shire Council	39,200
Lismore City Council	39,200
Richmond Valley Council	3,800
	82,200

Council regularly attracts government funding for flood and estuary related projects. Council considers grant-funding matching requirements on a case by case basis.

Write offs – rates, charges and debts to Council

The amount above which rates, charges and debts to Council may be written off only by resolution of the Council is fixed at $1,000.00 (ex-GST). Council delegates to the General Manager the power to write off rates, charges and debts equal to or below this threshold.

Expenditure

Council's estimated income and expenditure is contained in the attached Appendix titled *Financial Estimates.*

Borrowings

Council conducts its operations with an approved overdraft limit of $100,000 provided by the Commonwealth Bank of Australia. This facility is designed to cover short-term liquidity gaps.

Council will borrow $13.5M from an approved financial institution in 2020/21 for the purpose of water main upgrades. Amounts borrowed will be secured by mortgage over the income of Council.

Fees and charges 2020/21

Factors considered in determining fees and charges include: the cost of providing the service or goods; legislative requirements; market conditions and prices; and whether there is a community service obligation.

Code	Description	
L	Regulatory	A statutory charge set by the government.
Z	Zero Cost Recovery	Priced at 'no cost'; met entirely from general-purpose income.
P	Partial Cost Recovery	Priced to make a considerable (between 50% and 75%) contribution towards the operating costs, both direct and indirect, of providing the good/service. The remainder of the costs are met from general-purpose income.
F	Full Cost Recovery	Priced to make a significant (between 75% and 100%) contribution towards the operating costs, both direct and indirect, of providing the good/service. The remainder of the costs are met from general-purpose income.
M	Market	Priced in accordance with the prevailing market.

Goods and Services Tax (GST)

The following schedule of fees and charges has been prepared using the most current GST information. The impact of GST on Fees and charges is subject to change by legislation. Fees and charges are shown with GST included where appropriate at the time of writing.

T = Deemed to be taxable and fees/charges include GST

N = Deemed to be non-taxable and fees/charges exclude GST

E = Deemed to be exempt as the fee/charge is not a consideration.

Application of Code of Conduct for commercial tenancies

During the applicable period, Council will manage relevant requests for rental relief in accordance with the 'National Cabinet Mandatory Code of Conduct SME Commercial Leasing Principals during COVID-19', as legislated by the NSW Government. Per Council Resolution [15/20].

Code	Description	GST	2019/20 ($)	2020/21 ($)
Property information				
L	Property information certificate (section 603 *Local Government Act 1993*)	E	85.00	85.00
F	Property information certificate (section 603 *Local Government Act 1993*) URGENCY fee ** # ** Subject to confirmation that service is available # This fee is in addition to applicable certificate fe		85.00	85.00
P	Cancellation/min. processing fee (section 603 *Local Government Act 1993*)		40.00	41.00
Photocopying and printing				
F	Photocopying A4 (black)	N	1.40 per page	1.45 per page
	Photocopying A3 (black)		1.45 per page	1.50 per page
	Photocopying A4 (colour)		1.50 per page	1.55 per page
	Photocopying A3 (colour)		1.55 per page	1.60 per page
Dishonoured payments or direct debits				
F	The dishonour fee charged by financial institutions for dishonoured payments or direct debits may be passed on to the customer where payments have been rejected from the nominated financial institutio	N	As charged	As charged
Credit card surcharge				
P	Council is charged a fee based on a percentage of the payment amount by the credit card provider when a payment is made by credit card. Council will raise a surcharge against the credit card user at point of sale to recover costs incured by Council.	N	As charged	As charged
Conduct money				
F	Subpoena to produce	E	Price on application	Price on application
	Subpoena to attend to give evidence* *Generally, the cost of salary and any additional expenses associated with attendance.		Price on application	Price on application

Government Information (Public Access) Fees and charges

		Application fee	Other charges	Fee refund	Charge reduction	Fee and charge waiver, reduction or refund
Open access information		No	Photocopying charges as per Fees and Charges schedule.	N/A	N/A	By written application to the General Manager, and based on the circumstances of the case. Full waiver of charges will apply where the information is publicly released before or within 3 working days after being given to the applicant.
Proactive release		No	Photocopying charges as per Fees and Charges schedule.	N/A	N/A	
Informal release (on request)		No	No	N/A	N/A	
Formal access application	**Personal information**	$30.00	First 20hrs free then $30.00/hr thereafter (ss. 64(1) and 67).	Application not dealt with in time (s. 63(1)). Application invalid (s. 52(5)).	50% discount on processing charges where: • Applicant can demonstrate financial hardship (by producing evidence that they hold a Pensioner Concession card, are a full-time student, or a non-profit organisation (including a person applying for or on behalf of a non-profit organisation))(s.65 and clause 9 of Regulation). • The information applied for is of special benefit to the public generally (s.66).	
	Other information	$30.00 (incl. first hour of processing) (ss. 41 and 64(3)).	$30.00/hr (s.64(1)).			
Review	**Internal review**	$40.00 unless a review of a deemed refusal in which case there is no charge (section 85).	No	If review not decided within specified period (section 86).	N/A	

Legislation references in this table are to the *Government Information (Public Access) Act 2009* and *Government Information (Public Access) Regulation 2009*.

Note: No fee is payable for an external review by the Information Commissioner. Information regarding the applicable fees for review by the NSW Civil and Administrative Tribunal can be obtained by visiting the Tribunal's website at: http://www.ncat.nsw.gov.au/ or contacting the Tribunal directly on 1300 006 228.

General purpose revenues

Code	Description	GST	2019/20 ($)	2020/21 ($)
F	Rous retail consumers are levied with a per kilolitre charge (section 399 *Local Government Act 1993*)	N	2.43	2.53
	Annual facility charge 20mm water meter connection (section 501 *Local Government Act 1993*)		168.36	175.09
	Annual facility charge 25mm water meter connection (section 501 *Local Government Act 1993*)		259.86	270.84
	Annual facility charge 32mm water meter connection (section 501 *Local Government Act 1993*)		428.22	446.52
	Annual facility charge 40mm water meter connection (section 501 *Local Government Act 1993*)		673.44	699.06
	Annual facility charge 50mm water meter connection (section 501 *Local Government Act 1993*)		1,050.42	1,090.68
	Annual facility charge 65mm water meter connection (section 501 *Local Government Act 1993*)		1,775.10	1,848.30
	Annual facility charge 80mm water meter connection (section 501 *Local Government Act 1993*)		2,693.76	2,799.90
	Annual facility charge 100mm water meter connection (section 501 *Local Government Act 1993*)		4,209.00	4,373.70
L	Interest on overdue water charges (section 566(3) *Local Government Act 1993)* *Note: The maximum rate of interest payable on overdue rates and charges for the period 1 July 2020 to 31 December 2020 determined by the Minister for Local Government will be nil*		7.5%	0.0%
L	Interest on overdue water charges (section 566(3) *Local Government Act 1993)* *Note: The maximum rate of interest payable on overdue rates and charges for the period 1 January 2021 to 30 June 2021 determined by the Minister for Local Government will be charged*		7.5%	7.0%
F	Restrictor devices – fee to disconnect any restriction device, which may have been installed due to non-payment of account	E	305.00	312.00
L	Pensioner rebate (section 575 *Local Government Act 1993*)	N	Refer to 'Description'	
Z	Dialysis machine concession of 200 kilolitres per annum without consumption charges (section 502 *Local Government Act 1993*)		Refer to 'Description'	
	Recognised community organisations charged equivalent of 50% of the facility charge applicable to occupied properties for premises eligible for a rebate of general rates through their respective constituent councils but with all consumption being charged at the standard rate (section 610A *Local Government Act 1993*)		Refer to 'Description'	

Consumer services

Code	Description	GST	2019/20 ($)	2020/21 ($)
F	Outstanding Notices certificate (section 735 *Local Government Act 1993*)	E	48.00	50.00
	Outstanding Notices certificate *(*section 735A *Local Government Act 1993*) URGENCY fee ** # ** Subject to confirmation that service is available # This fee is in addition to applicable certificate fe		48.00	50.00
	Backflow device re-registration non-compliance fee (Notice to Comply within 30 days		103.00	107.00
	Testing of water meter	N	382.00	387.50
	Special meter reading	E	82.00	85.00
	Special meter reading – URGENCY fee**# ** Subject to confirmation that service is available # This fee is in addition to applicable certificate fe		82.00	85.00
	Consumer connection fee for a standard 20mm service (section 608 *Local Government Act 1993*)	N	1,185.00	1,200.00
	Consumer activation fee for a standard 20mm service where water meter already connected (section 608 *Local Government Act 1993*)		260.00	266.00
	Consumer activation fee for a standard 20mm service where water meter connection also required (section 608 *Local Government Act 1993*)		430.00	436.00
	Consumer connection fee equal to the estimated actual cost + 10% to provide other than a standard 20mm service (section 608 *Local Government Act 1993*)		Price on application	Price on application
	Disconnection fee (section 608 *Local Government Act 1993*)		142.00	146.00
	Reconnection fee (section 608 *Local Government Act 1993*)		Price on application	Price on application

Water filling station

Code	Description	GST	2019/20 ($)	2020/21 ($)
P	Annual permit fee charged to bulk water carrier for potable water (section 501 *Local Government Act 1993*). Fee may be pro-rata from approval date. with min. 3 month increments (Non-refundable)	E	631.00	647.00
	Annual permit fee charged to bulk water carrier for non-potable water (section 501 *Local Government Act 1993*) Fee may be pro-rata from approval date. with min. 3 month increments (Non-refundable)		631.00	647.00
	Price of water per kilolitre (section 610A *Local Government Act 1993*)	N	5.75	5.90
F	Filling station access key	E	78.00	80.00

Temporary water supply

Code	Description	GST	2019/20 ($)	2020/21 ($)
P	Special Approved Connections – retail consumers with a temporary connection or, non-payment of capital headworks fee(s), are levied with a per kilolitre charge (section 399 *Local Government Act 1993*)	N	4.66	4.78

Contract works

Code	Description	GST	2019/20 (%)	2020/21 (%)
F	Administration charge % – where the GST exclusive value of the construction work undertaken on behalf of other parties or as part of a mains extension which requires a financial contribution by other parties is $20,000 or less	T	15	15
	Administration charge % – where the GST exclusive value of the construction work undertaken on behalf of other parties or as part of a mains extension which requires a financial contribution by other parties exceeds $20,000.		10	10

Development servicing charges

Code	Description	GST	2019/20 ($ per e.t.)	2020/21 ($ per e.t)
P	Bulk Developer charge	E	8,733.00	8,872.00

Water service capital connection fees

Code	Description	GST	2019/20 ($ per e.t.)	2020/21 ($ per e.t)
P	Bulk Headworks connection fee	E	8,733.00	8,872.00

Note: Water Service Capital Connection fees will be reduced by any applicable contribution paid in relation to supply of water through a development approval process.
e.t means equivalent tenement.

Permissable activities on operational land

Code	Description	GST	2019/20 ($)	2020/21 ($)
F	Permit processing fee. Charged in addition to a temporary permit fee (*)	E	172.00	177.00
	Ecotourism – temporary permit fee*		258.00	265.00
	Seed collection – temporary permit fee*		147.00	151.00
	Personal fitness training – temporary permit fee		97.00	100.00
L	Commercial filming and photography fees will be charged in accordance with the Local Government Filming Protocol under the *Local Government Act 1993*		Price on application	Price on application
F	Wedding ceremony booking fee	T	176.00	180.00

Recovery of fees under the *Biosecurity Act 2015*

Code	Description	GST	2019/20 ($)	2020/21 ($)
F	Recovery of fees charged, or costs or expenses incurred, in connection with the exercise of functions by an authorised officer (see section 373 of *Biosecurity Act 2015*).	E	COST	COST

Fees and charges 2020/21 | Richmond Water Laboratories

Richmond Water Laboratories

Richmond Water Laboratories (RWL) is a NATA accredited laboratory and conducts its tests in accordance with AS ISO/IEC 17025:2005. For details of the scope of Richmond Water Laboratories accreditation, please refer to the NATA website: www.nata.com.au

Suites	2020/21 incl.GST
Faecal Contamination: E.coli	$49.00
Tank Water Quality: pH, eC, TDS, Fe, Pb, Zn, Cu, Ca, HCO_3, LSI, Mg, Hardness	$79.50
Bore Water Quality: pH, eC, TDS, Hardness, Alkalinity, NO_3, Turbidity, Al, As, Ca, Cd, Cr, Cu, Fe, Mg, Mn, Ni, Zn	$155.00
Nursery Irrigation Quality: pH, eC, Cl-, HCO_3 , Al, Fe, B, Mn, Cu, Na, Zn, Ca, Mg, hardness, NH_3N, turbidity, SAR	$158.50
Annual Private Water Supply Quality: pH, TDS, hardness, turbidity, Sb, As, Cd, Ca, Cr, Cu, F-, Pb, Ni, NO_3, NO_2, Mg, Mn, SO_4	$185.00

Note: Richmond Water Laboratories reserves the right to offer discounts for routine analysis dependant on the range and volume of samples.

Following are tests and limits of reporting provided by RWL. For further details please contact RWL on (02) 6623 3888; waterlab@waterlab.com.au; or www.waterlab.com.au.

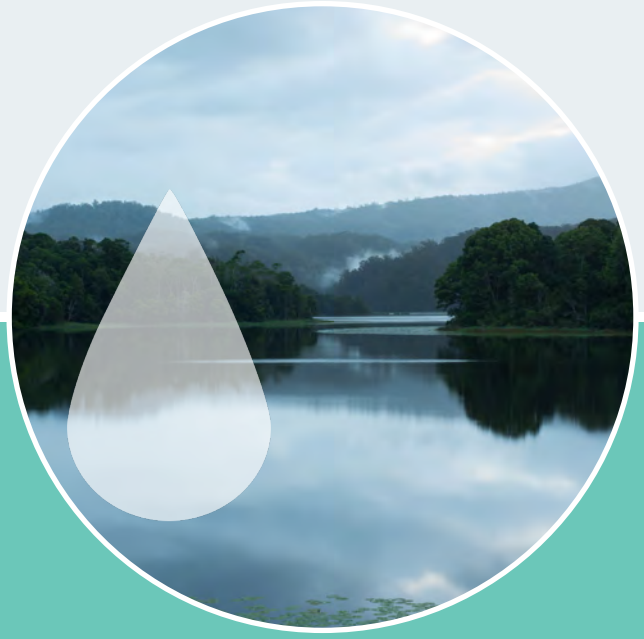
Test description	Limit of reporting
Alkalinity - CO_3^2, HCO_3, OH & total	0/20/0/20 mg/L
Alkalinity - total as $CaCO_3$	20 mg/L
Al, Fe, Mn suite	0.005 mg/L
Biological Oxygen Demand (BOD)	2 mg/L
Ca, Mg & hardness	0.1/0.1/1 mg/L
Ca, Mg, Na, K suite	0.1/0.1/0.15/0.1 mg/L
Chemical oxygen demand (COD)	25 mg/L
Chemical oxygen demand (COD) - dissolved	25 mg/L
Chloride	2 mg/L
Chlorine - free	0.05 mg/L
Chlorine - total	0.05 mg/L
Chlorophyll 'a'	2 mg/L
Colour - apparent	2 Pt-Co units
Colour - true	2 Pt-Co units
Cu, Pb, Zn suite	0.005 mg/L
Data management	per hour

Test description	Limit of reporting
Dissolved oxygen	0.2 mg/L
E. coli	1 MPN/100mL
Electrical conductivity	1 µS/cm
Faecal coliforms	1 MPN/100mL
Fluoride	0.05 mg/L
Hardness	1 mg/L
Heterotrophic Plate Count (HPC)	2 MPN/mL
Langelier Saturation Index#	N/A
Metals in water	0.005-0.01 mg/L
Metals in soil	1-7 mg/kg
Microscopic examination#	POA
Nitrogen - ammonia	0.01 mg/L
Nitrogen - nitrate	0.05 mg/L
Nitrogen - nitrite	0.01 mg/L
Nitrogen - oxidised	0.05 mg/L
Nitrogen - total	0.1 mg/L

Test description	Limit of reporting
Nitrogen - total Kjeldahl	0.1 mg/L
Oil & grease	2 mg/L
pH	pH units
Phosphorus - orthophosphate (reactive PO_4)	0.03 mg/L
Phosphorus - total	0.05 mg/L
Redox#	mV
Sodium Absorption Ratio# (with Na, Ca, Mg)	calculation
Solids – total dissolved by calculation (TDS)	1 mg/L
Solids – total dissolved gravimetric (TDS)	5 mg/L
Solids – total suspended (TSS or NFR)	1 mg/L
Solids - volatile suspended (VSS)	1%
Sulphate#	1 mg/L
Total coliforms	1 MPN/100mL
Turbidity	0.1 NTU
Urgent analysis#	50% test cost
UV Absorbance @254nm and Transmissivity	0.01 abs & 1 %

# denotes tests not covered under scope of accreditation

Appendix – Financial Estimates



Budget forecast summary - consolidated
Delivery program 2020/21 - 2023/24

	YE 30 June 2021	YE 30 June 2022	YE 30 June 2023	YE 30 June 2024
Operating income				
Flood Mitigation	1,194,900	958,000	1,045,800	1,145,300
Weed Biosecurity	1,379,100	1,391,800	1,427,900	1,465,000
Retail Water Supply	2,804,500	2,908,500	3,042,600	3,181,700
Richmond Water Laboratories	821,000	840,400	868,900	890,400
Commercial Property	269,200	266,300	303,900	324,800
Bulk Water Supply	18,438,100	19,479,800	20,537,100	21,863,300
Fleet Operations	93,400	95,500	99,600	104,400
	25,000,200	**25,940,300**	**27,325,800**	**28,974,900**
Operating expense				
Flood Mitigation	2,346,400	1,915,300	1,875,800	1,901,000
Weed Biosecurity	1,425,500	1,381,100	1,417,500	1,454,900
Retail Water Supply	3,021,100	2,851,900	3,001,900	3,159,200
Richmond Water Laboratories	815,900	829,200	853,000	867,400
Commercial Property	367,800	378,200	388,400	408,900
Bulk Water Supply	20,087,400	20,008,200	19,706,500	19,721,800
Fleet Operations	93,800	92,300	90,500	88,700
	28,157,900	**27,456,200**	**27,315,600**	**27,601,900**
Operating result	**(3,157,700)**	**(1,515,900)**	**10,200**	**1,373,000**
Less depreciation	7,104,000	7,358,100	7,498,900	7,723,400
Operating result excluding non cash	**3,946,300**	**5,842,200**	**7,509,100**	**9,096,400**
Add: Capital income	20,750,100	5,786,400	5,889,400	4,308,000
Less: Loan capital	3,195,900	3,395,800	3,608,300	3,830,800
Less: Capital expense	19,574,000	21,143,879	5,959,900	16,802,000
Reserve funds - increase / (decrease)	**1,926,500**	**(12,911,079)**	**3,830,300**	**(7,228,400)**

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ROUS
COUNTY COUNCIL

Questions or comments?

To provide your feedback please contact us by:

email council@rous.nsw.gov.au
telephone (02) 6623 3800
post Rous County Council
218-232 Molesworth Street
LISMORE NSW 2480

Water usage charges write-off

(11390/99)

Business activity priority	Strategy and planning
Goal 2	Align strategic direction to core functions and sustainability

Recommendation

That Council approve the write-off of $1,564.92 in water charges from R and G Lock's water account in relation to a property at 191 Mason Road, Tucki Tucki, due to reasons outlined in the report.

Background

Due to the failure of a water meter union supplying 191 Mason Road, Tucki Tucki (property), owned by R and G Lock (property owner), staff are seeking to reduce water usage charges to average usage and write-off the remaining amount.

The proposal has been assessed against the write-off criteria under clause 131 of the *Local Government (General) Regulation 2005* and it satisfies the requirements of that provision.

Key points

- 17 January 2020: property owner received their quarterly water account from Council and found the water usage charges were significantly increased. Subsequently, they checked the water meter and found water pouring out of the meter union on the property owner's side of the water meter. They took a photo of the leaking meter union and then tightened the fitting to stop the leak.

- 20 January 2020: property owner contacted Council by phone to inform us of their findings and forwarded a copy of the photo by text message.

- Council staff attended the property to check the fitting and obtain the usage data that is captured in the remote reading device located on the top of the water meter. The data showed the water usage began increasing in late November 2019 and continued until 18 January 2020.

Council is responsible for repair and maintenance of all pipes and fittings from the water supply pipeline up to and including the meter. Therefore, as the leak occurred at the meter union (which forms part of the water meter) and the additional usage registered through the water meter was charged to the property owner, an account reduction to average usage is warranted.

The total water charges for the period 31 October 2019 to 20 January 2020 are $1,691.28. The estimated water usage charges (calculated using the average daily usage from the previous 12 months water meter readings) are $126.36. The difference between the actual and estimated water charges is $1,564.92.

Governance

Finance

The write-off of $1,564.92 in water charges will be expensed to other direct costs in the water operations budget area.

Consultation

This report was prepared in consultation with the Operations Engineering Manager, Water Operations Team Leader, Finance Manager and Finance Team Leader Accounts.

Conclusion

It is proposed that Council approve the write-off of $1,564.92 in water charges from R and G Lock's water account in relation to a property at 191 Mason Rd, Tucki Tucki.

Guy Bezrouchko
Group Manager Corporate and Commercial

Retail water customer account assistance

(2283/20)

Business activity priority	Strategy and planning
Goal 2	Align strategic direction to core functions and sustainability

Recommendation

That Council in accordance with section 356 (1) of the *Local Government Act 1993* and its 'Retail Water Customer Account Assistance' policy, approve financial assistance as listed in Table 1 of this report.

Background

Applications for financial assistance in accordance with section 356 (1) of the *Local Government Act 1993* and under Council's 'Retail Water Customer Account Assistance' policy are tabled below:

Table 1

Account	Property owner/s	Date application received	Nature of leak	Original water charges due	S356 financial assistance to be approved	Adjusted water charges due after approval
10255-11000-8	Fevosa Pty Ltd	19-Apr-20	Pipe between meter and house broken from large tree roots. No sign of leak on surface, water ran into hillside.	$3,873.42	$1,993.82	$1,879.60
11646-10000-5	J & D & J Young	31-Mar-20	Leak found under ground near meter, water pooled outside property on verge	$2,323.08	$831.06	$1,492.02
10496-10000-8	The Owners - Strata Plan 84845	24-Apr-20	Burst water pipe - 32mm pressure elbow split near water meter, under concrete.	$2,745.90	$1,148.18	$1,597.72
10314-10000-8	S & LZ Rollston	15-May-20	2 Burst pipes - under grass approx. 100m away from house, and under house	$5,073.84	$2,894.13	$2,179.71
Total				**$14,016.24**	**$6,867.19**	**$7,149.05**

Governance

Finance

The 2019/20 financial year budget allocation for applications made in accordance with the 'Retail Water Customer Account Assistance' policy is $25,000.

2019/20 financial year budget	$ 25,000.00	No. of applications
S356 assistance approved financial year to date	$ 13,621.69	8
S582 assistance approved financial year to date	*$ 3,097.76*	*2*
S582 assistance approved since last Council meeting	*$ -*	*0*
Proposed S356 assistance approval this Council meeting	$ 6,867.19	4
Proposed S582 assistance approval this Council meeting	*$ -*	
Budget remaining 2019/20 financial year	**$ 1,413.36**	

Legal

Section 377(q) of the *Local Government Act 1993* provides that a decision under section 356 to contribute money or otherwise grant financial assistance may not be delegated and that the decision must be made by resolution of Council.

Conclusion

The total value of section 356 financial assistance equates to $6,867.19 by application of Council's 'Retail Water Customer Account Assistance' policy. It is proposed that Council grant the recommended financial assistance.

Guy Bezrouchko
Group Manager Corporate and Commercial

Rous County Council Catchment Management Plan 2021-2025 (surface water drinking water catchments)

(1181/18)

Business activity priority	Strategy and planning
Goal 2	Align strategic direction to core functions and sustainability

Recommendation

That Council:

1. Receive and note this report which provides an overview of the staged development of the Rous County Council *Catchment Management Plan 2021–2025*.
2. Receive and note the submissions report outlining the public exhibition process and outcomes.
3. Adopt the Rous County Council *Catchment Management Plan 2021–2025,* allowing incorporation of the activities into the Operational plan for 2020/21 and the Long-Term Financial Plan.

Background

In keeping with the "catchment to tap" management approach recommended in the Australian Drinking Water Guidelines (ADWG), Rous County Council (RCC) is developing and implementing a Catchment Management Plan (CMP) for its major drinking water supply catchments. The CMP covers the "catchment to treatment plant" component of the water supply system and forms part of the Drinking Water Quality Management System (DWMS) being implemented by RCC.

The Business Activity Strategic Plan 2012-2032 indicates that RCC will "Maximise the quality of source water through the integrated management of the water supply catchment and biodiversity and implementation of Catchment Management Plans." The 2017-2021 Delivery program identifies a deliverable to "Develop Catchment Management Plans for all council water sources (excluding groundwater)."

During 2019/20, RCC (and consultants *Hydrosphere Consulting*) – in partnership with key stakeholders – prepared a Draft *Catchment Management Plan 2021–2025.* A copy of the draft CMP is included as Attachment 1.

The purpose of the CMP is to set the strategy for the coordinated management of RCC's drinking water catchments for the next 5 years (2020/21- 2024/25). The CMP consolidates and replaces the previous catchment management plans for Rocky Creek Dam (RCD), Emigrant Creek Dam (ECD) and the Wilsons River Source (WRS).

The key focus is to minimise the introduction of hazards to source water by maintaining and strengthening the existing catchment controls and undertaking additional, feasible tasks to manage catchment risks. If source water is of a high quality, risks are reduced in all later stages of drinking water supply. Good quality source water requires less complex treatment systems, less chemical additions and reduced cost and energy consumption through treatment processes.

The recommended management actions in the CMP have been developed from the current status of the catchments and identified catchment risks, input from land managers and consideration of the current allocation of resources and funding. The CMP has been developed in three stages as follows:

Stage 1: Status of existing RCC CMP Actions (documented in Appendix 1 of the CMP).

Stage 2: RCC Drinking Water Catchment Risk Assessments - update of risk assessments for each catchment taking into consideration the CMP actions already undertaken and any relevant changes in land use, risk factors and the planning environment (documented in Appendix 2 of the CMP).

Stage 3: Catchment Management Plan 2021-2025 - a targeted and realistic plan for the coordinated management of RCC's drinking water catchments for the next five years (2021-2025).

The purpose of this report is to summarise the outcome of the staged development of the CMP, to summarise the public exhibition process, and to provide the Draft CMP to Council for adoption.

Implementation plans for the three operational drinking water catchments, RCD, WRS and ECD focus on drinking water management. The Dunoon Dam (DD) plan has a strategic focus on land management for land owned by RCC in that catchment.

This CMP focuses on those actions under the direct control of RCC, although RCC will continue to work with catchment stakeholders and collaborate wherever management responsibilities are shared.

This CMP sets a clear division of responsibilities between RCC and other stakeholders and provides a formal process around how RCC will continue to engage with stakeholders for effective management of drinking water catchments.

The CMP will allow RCC to confirm budget requirements through the Integrated Planning and Reporting (IP&R) framework and will also increase the likelihood of attracting grant funding by allowing RCC to leverage the identified projects and by supporting funding applications by others.

Governance

Finance

The draft Delivery program / Operational plan presented to the April 2020 Council meeting contained budget allocations of $619,100 for the next five years based on the old CMP recommendations.

The proposed business plan showing the key components of the new CMP (table 9, page 60-61 of Attachment 1) requires $1,134,000 over the five-year period, an increase of $514,900.

It is proposed to reallocate the existing budget of $619,100 to align with the new CMP and increase the allocations for the next five years accordingly.

	2020/21	2021/22	2022/23	2023/24	2024/25	Total Program
Existing budget allocations as identified in the Delivery program/Operational plan	140,600	85,000	148,400	59,800	185,300	**619,100**
New Catchment Management Plan 2021-2025	148,000	295,000	345,000	173,000	173,000	**1,134,000**
Budget variance	**7,400**	**210,000**	**196,600**	**113,200**	**(12,300)**	**514,900**

Legal

Together with the DWMS, the CMP forms part of the 'quality assurance program' that is required under the *Public Health Act 2010* and *Public Health Regulation 2012*. In accordance with the *Local Government Act 1993*, the CMP actions to be completed by RCC shall be included in the RCC Integrated Planning and Reporting rocess. This implementation process will allow effective monitoring and evaluation so that the completion of actions and the effectiveness of the CMP can be regularly reviewed.

Consultation

In addition to representation from RCC and the consultants preparing the plan, development of the CMP has been informed by 2 days of water quality risk management workshops that involved representatives from a range of catchment stakeholders including our constituent Councils, North Coast Public Health Unit, Roads and Maritime Services, Environment Protection Authority, Local Land Services, the Australian Macadamia Society, NSW Farmers, and the North Coast Meat Cooperative.

NSW Fire and Rescue, NSW Rural Fire Service, National Parks and Wildlife Service and Landcare representatives (including Richmond Landcare Inc., Big Scrub Landcare and Brunswick Valley Landcare) were invited but unable to attend the risk workshops.

A workshop was held with Council on 18 March 2020 to present the Draft CMP.

In addition to the stakeholder workshops and review of the draft water quality risk assessments, all stakeholder organisations have also been provided with an opportunity to review the draft plan. The Draft CMP was placed on public exhibition for a 3-week period (from 23 April – 14 May 2020) providing the invited stakeholders and the broader community the opportunity to review the Draft CMP.

The CMP has also been reviewed by internal stakeholders.

A Submissions Report has been prepared that summarises the details of the submissions received, the comments made and how the comments have been addressed. A copy of the Submissions Report is included as Attachment 2.

Conclusion

RCC and its consultants have completed consultation and assessment work in relation to the water quality status of the surface water drinking water catchments. The *RCC CMP 2021-2025* has been prepared in consultation with the key stakeholders listed above. The CMP provides a strategic framework to guide the feasible catchment management activities to be undertaken by RCC and our catchment partners and is recommended for adoption.

Andrew Logan
Planning Manager

Attachments:

1. RCC Catchment Management Plan 2021-2025 (final for adoption)
2. RCC Catchment Management Plan public exhibition submissions report

Website links:

Link to CMP Appendices:

1. APPENDIX 1. STATUS OF EXISTING RCC CATCHMENT MANAGEMENT PLAN (CMP) ACTIONs
2. APPENDIX 2. RCC DRINKING WATER CATCHMENTS RISK ASSESSMENT 2020
3. APPENDIX 3. PROJECTS THAT ARE NOT FUNDED IN THE CMP

https://drive.google.com/open?id=1U_1I96GyuZRLnG-vIE-IHtV4ycI1tzbF

Hydrosphere Consulting

ROUS COUNTY COUNCIL

BULK WATER SUPPLY | WEED BIOSECURITY | FLOOD MITIGATION

Rous County Council

Catchment Management Plan 2021-2025

Final Report

Disclaimer:

This report has been prepared on behalf of and for the exclusive use of Rous County Council, and is subject to and issued in accordance with the agreement between Rous County Council and Hydrosphere Consulting. Hydrosphere Consulting accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

Cover photo: Healthy waterway of Upper Wilsons Creek, headwaters of the Wilsons River Source

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19-047: ROUS CATCHMENT MANAGEMENT PLAN

REV	DESCRIPTION	AUTHORS	REVIEW	APPROVAL	DATE
0	Draft for client review	K. Pratt	R. Campbell	M.Howland	13/03/20
-	Draft for Public Exhibition			K.Pratt	21/04/20
1	Final updated following Public Exhibition	K. Pratt		M.Howland	20/05/20

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TABLES

FIGURES

1. INTRODUCTION

Rous County Council (RCC) provides bulk water to four local water utilities on the far north coast of NSW as well as rural and urban connections direct from the bulk supply trunk main system. Surface water is sourced from three supplies at Rocky Creek Dam (RCD), Wilsons River Source (WRS) and Emigrant Creek Dam (ECD).

The purpose of this Catchment Management Plan (CMP) is to set the strategy for the coordinated management of RCC's drinking water catchments for the next 5 years (2021-2025). This CMP fulfils the requirements of the Australian Drinking Water Guidelines (ADWG, NHMRC, NRMMC, 2011) from catchments to the offtake points for water supplies as a critical part of the overall RCC Drinking Water Management System (RCC, 2018).

This CMP replaces the previous catchment management plans for Rocky Creek Dam, Emigrant Creek Dam and Wilsons River Source. The key focus of this CMP is to minimise the introduction of hazards in source water by maintaining and strengthening the existing catchment controls and providing additional tasks to manage catchment risks.

If source water is of a high quality, risks are reduced in all later stages of drinking water supply. Good quality source water requires less complex treatment systems, less chemical additions and reduced cost and energy consumption through treatment processes.

This CMP incorporates management actions to address key risks to drinking water quality. The recommended management actions are logical outcomes of the existing information collected, the current status of catchments and catchment risks, input from key stakeholders and consideration of the current allocation of resources and funding. The CMP has been developed in three stages as follows:

- Stage 1: Status of Existing RCC Catchment Management Plan (CMP) Actions – a review of the current status of existing CMP actions (refer Appendix 1);
- Stage 2: RCC Drinking Water Catchments Risk Assessment 2020 - update of catchment risk assessments for each catchment taking into consideration the CMP actions already undertaken and any relevant changes in land use, risk factors and the planning environment (refer Appendix 2); and
- Stage 3: Catchment Management Plan 2021-2025 (this report) - a targeted plan for the coordinated management of RCC's drinking water catchments for the next 5 years (2021-2025).

Implementation plans for the three operational drinking water catchments, RCD, WRS and ECD focus on drinking water management. The Dunoon Dam (DD) plan has a strategic focus on land management for land owned by RCC in that catchment.

This CMP focuses on those actions under the direct control of RCC, although RCC will continue to work with catchment stakeholders and collaborate wherever management responsibilities are shared. This CMP sets a clear division of responsibilities between RCC and other stakeholders and provides a formal process around how RCC will continue to engage with stakeholders for effective management of drinking water catchments.

The CMP will allow RCC to confirm budget requirements through the Integrated Planning and Reporting (IP&R) framework, and will also increase the likelihood of attracting grant funding by allowing RCC to leverage the identified projects and by supporting funding applications.

2. BACKGROUND TO THE CATCHMENT MANAGEMENT PLAN

2.1 Water Supply System Overview

The RCC bulk water supply system supplies water to approximately 100,000 people (51,000 connections) in the Byron, Ballina, Lismore and Richmond Valley Local Government Areas (LGAs). The bulk supply network services supplies on average 11,700 ML/a to the urban areas of Ballina Shire Council (BSC) excluding Wardell and surrounds, Byron Shire Council (BySC) excluding Mullumbimby, Lismore City Council (LCC) excluding Nimbin, Richmond Valley Council (RVC) excluding Casino and all land west of Coraki and rural and urban connections direct from the bulk supply trunk main system.

RCD is the principal source of water for the RCC regional supply and is supplemented by ECD, the WRS and several bore sites in Alstonville and Woodburn. These additional sources are brought on-line as the storage level in RCD drops to help secure the water supply and avoid water restrictions. Detailed information on the drinking water catchments is provided in Section 3.

Figure 1 provides an overview of RCC's current surface water drinking catchments of RCD, ECD and WRS. It also shows the Dunoon Dam (DD) catchment, a potential future surface water source, which does not form part of the current supply system.

RCC's drinking water catchments span the three local government areas of Lismore, Byron and Ballina. Figure 2 shows the division of catchments into the three different LGAs as follows:

- RCD – Lismore LGA
- WRS – Lismore, Byron and Ballina LGAs
- ECD – Ballina LGA
- DD – Lismore LGA

The following sections provide an overview of the current status of each catchment including land use, water quality and details of water extraction and treatment.

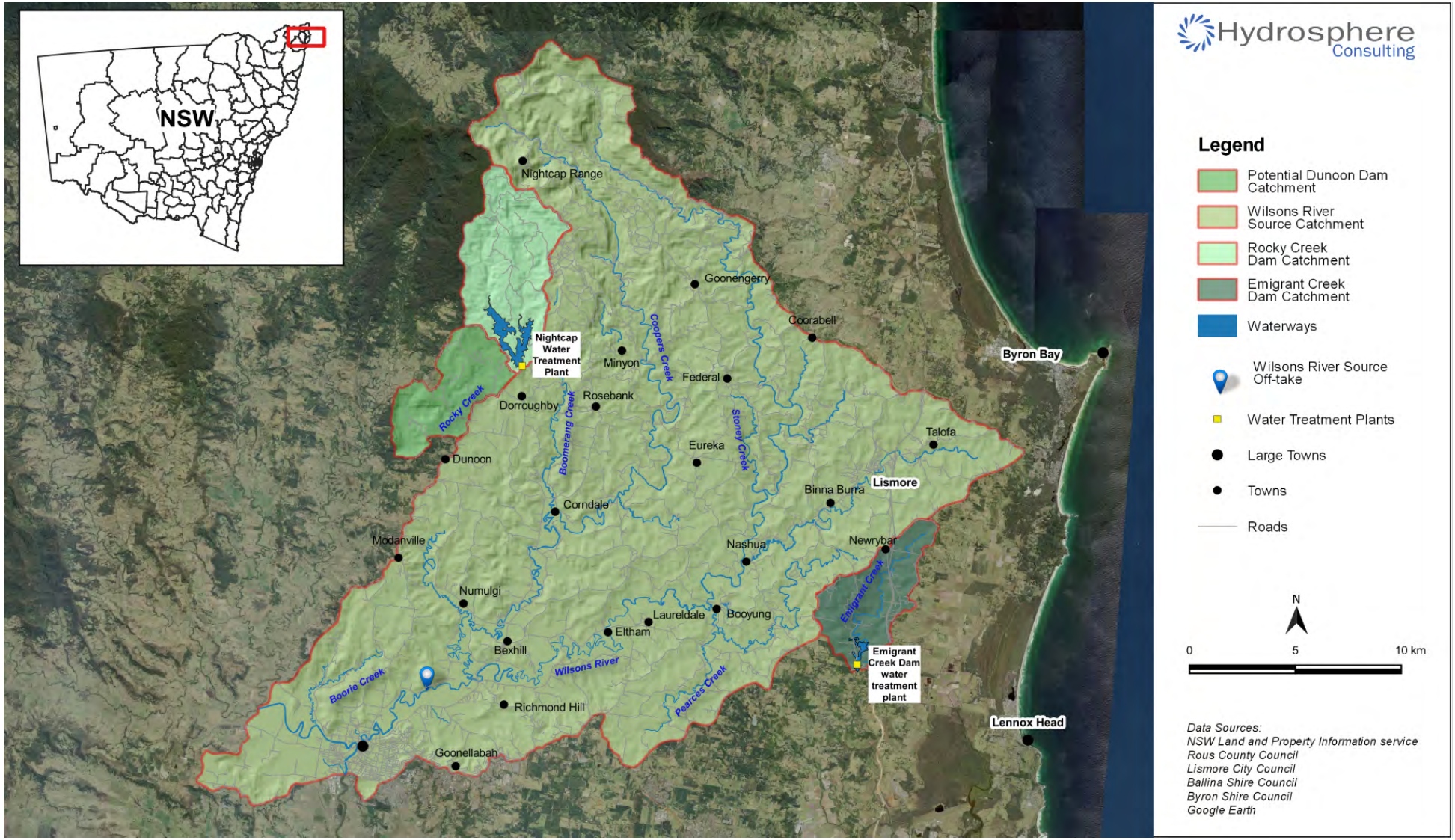

Figure 1: RCC's surface water catchments: Rocky Creek Dam, Emigrant Creek Dam and Wilsons River Source and potential Dunoon Dam

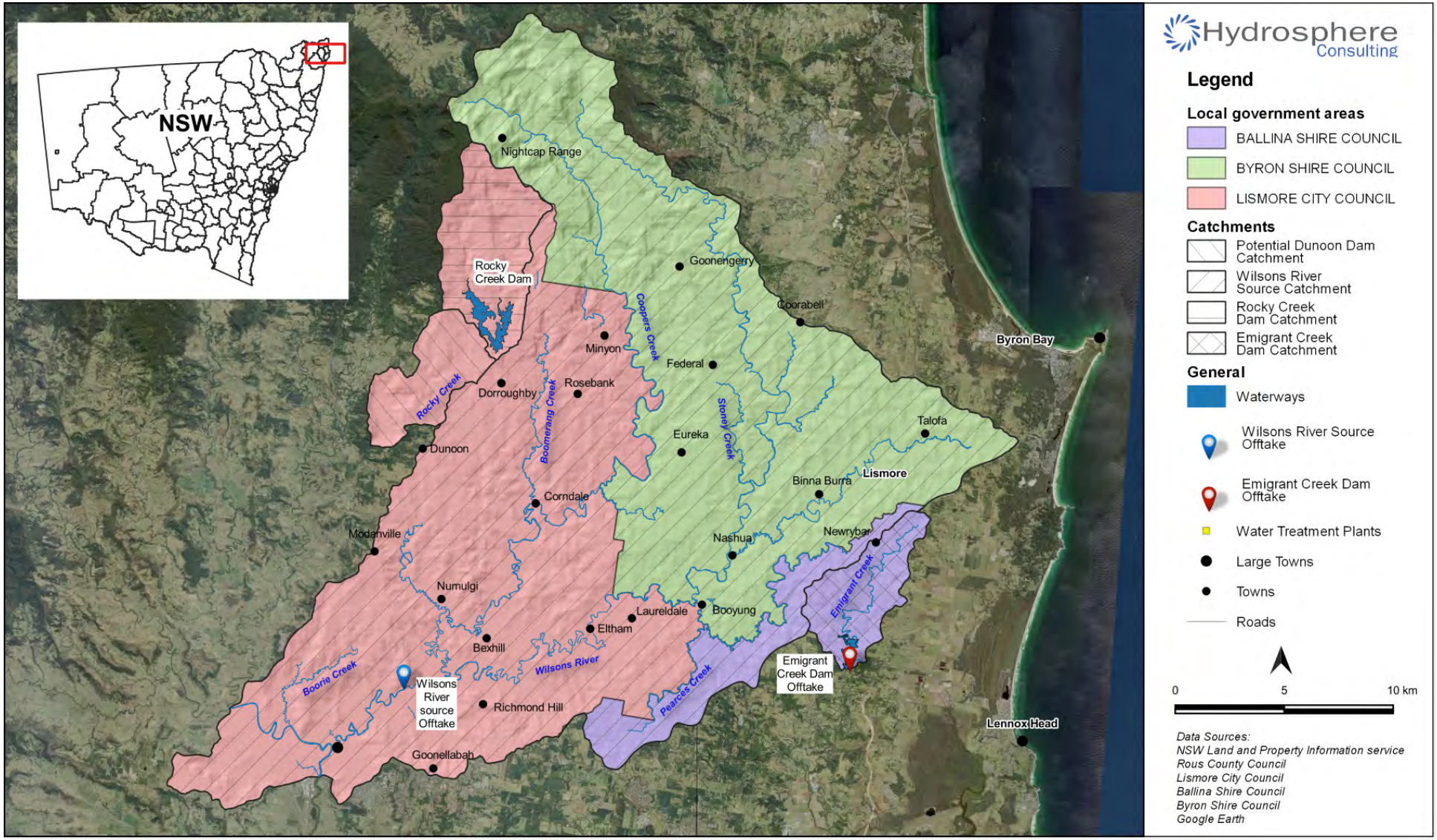

Figure 2: Division of catchments into local government areas

2.2 The Australian Drinking Water Guidelines and Catchment Management

The Australian Drinking Water Guidelines (ADWG; NHMRC, NRMMC, 2011) emphasise the importance of protecting water sources (catchments) and provide a number of overarching principles for catchment management, including: "*prevention of contamination provides greater surety than removal of contaminants by treatment, so the most effective barrier is protection of source waters to the maximum degree practical*."

RCC is required to comply with the ADWG which include the “Framework for Management of Drinking Water Quality" that emphasises:

- Multiple barriers are required to protect drinking water quality;
- The most effective barrier is the protection of source waters;
- Source waters should be protected to the maximum degree practical;
- Water quality should be maintained at the highest practicable quality; and
- Water quality should not be degraded even if it complies with guideline values by a safe margin.

2.2.1 RCC Drinking Water Management System

RCC has developed a Drinking Water Management System (DWMS) that fulfils the requirements of the ADWG (RCC, 2018). The RCC DWMS addresses risks from the receiving point in the catchment (offtake points for water supplies) to the customer tap. A critical part of the DWMS is the assessment of catchment water quality, catchment hazard identification, risk assessment and specification of control measures. This CMP (including risk assessments) fully implements the requirements of the ADWG as part of the overall RCC DWMS from catchments to the offtake points for water supplies.

2.3 RCC Drinking Water Quality Monitoring Program

RCC carries out regular testing of both source (raw) water and treated drinking water as one of the key measures to help ensure a safe drinking water supply. Extensive sampling and analysis is carried out by accredited NATA laboratories to confirm compliance with agreed targets, to assess raw water quality and identify sources of contamination or changes through time, provide data to inform long term treatment effectiveness and for quality assurance of testing by treatment plant operators. Comprehensive analysis and interpretation of water quality data is undertaken periodically and was last completed in 2015 (Hydrosphere Consulting, 2015). Further analysis of the last five years of water quality data (2015-2019) was undertaken as part of the Stage 2 Risk Assessment to update and review water quality risks (Appendix 2).

2.4 Previous Catchment Management Plans and Risk Assessments

2.4.1 Wilsons River Catchment Management Plan (Ecos, 2009a)

This CMP is a risk-based catchment and investment strategy to direct activities aimed at protecting drinking water quality at the WRS and an environmental monitoring program to underpin the on-going adaptive management of the water source catchment. Ecos (2009b) completed a detailed modelling and mapping-based risk assessment across 12 sub-catchments in consultation with a broad range of stakeholders. The risk assessment identified a range of risks associated with agricultural and urban land use and provided spatially referenced (mapped) risk scores across the catchment in a number of categories (e.g. sediment, nutrients, pathogens, pesticides etc.). In general, the greatest risks from diffuse pollutant sources were derived from the lower catchment close to the WRS offtake at Howards Grass and risk decreased with distance from the offtake (Figure 3). This identified the lower catchment close to the WRS offtake as a priority zone for management.

A key purpose of the CMP was to identify opportunities for the various stakeholders in the catchment to work together for positive outcomes for the catchment, water supply, and participants. To meet the guiding principles, key outcome areas (KOAs), management programs and plans were identified, each with associated goals and aims. The four KOAs are:

1. Environmental Management.
2. Agronomic Land Management Practices.
3. Management of Built Environments.
4. Governance.

The CMP contained a detailed list of 98 actions for implementation in a number of categories to address risks. The review of the status of actions of the 2009 CMP completed as part of Stage 1 of this CMP project, revealed that a number of actions were complete and on-going as part of River Reach Plan on-ground works in the lower catchment, planning and policy review and RCC normal operations and engagement activities. However, many actions were assessed as incomplete or unknown due to those actions being the responsibility of other authorities, organisations and/or landholders and therefore outside of the direct control of RCC (Appendix 1). Focusing management action in areas under the direct control of RCC is a key requirement for this CMP.

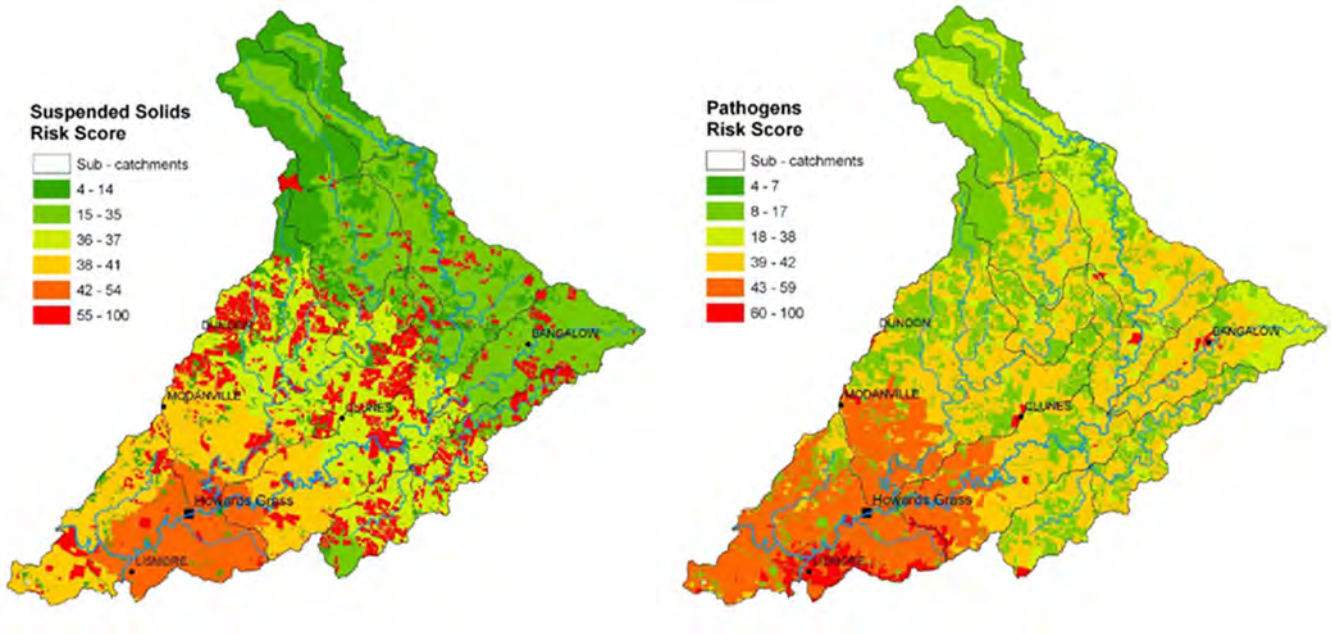

Figure 3: Wilsons River catchment risk scores (Left: suspended soils; Right: pathogens)

Source: Ecos, 2009b

Catchment Management Plan for Emigrant Creek Catchment (Water Futures, 2013)

The CMP covers the "catchment to treatment plant" component of the water supply system. It fed into the more engineering-focused "treatment plant to tap" management plan being implemented by RCC and its constituent councils. Together, these management plans form the DWMS that is required under the *Public Health Act 2010*.

The vision for the catchment stated in the CMP is: "*a healthy, productive catchment with fully functioning ecosystems that produces clean water*".

The following stages were completed in developing the CMP:

- Preparing a written description of the catchment and source water.

- Setting water quality objectives for raw drinking water and ecosystem health.
- Assessing source water quality against those water quality objectives.
- Assessing risks to water quality with the catchment in its current state.
- Identifying future actions for RCC and stakeholders to reduce risks.

A series of management actions were identified and allocated to RCC and other stakeholders to reduce residual risks associated with Hazmat spills on roads, road construction runoff, unrestricted stock grazing, failing on-site sewage management systems, fertiliser runoff, agricultural soil erosion runoff and natural manganese (Water Futures, 2013).

The review of the status of actions of the 2013 CMP completed as part of Stage 1 of this CMP project revealed that a number of actions were complete and on-going as part of River Reach Plan on-ground works in reaches immediately upstream of the dam, planning and policy review and RCC normal operations and engagement activities. However as noted for the Wilsons River CMP, many actions were assessed as incomplete or unknown due to those actions being outside of the direct control of RCC (Appendix 1). There was also a number of incomplete actions associated with stock management (e.g. fencing, stock crossings, off-stream watering etc.) due to a lack of River Reach Plan up-take with grazing landholders. Additionally, collaborative actions with the Australian Macadamia Society (AMS) to produce farm-based erosion management plans to address sediment export were incomplete due to RCC resolving not to pursue this at that time. Given the continuing risk to drinking water associated with stock waterway access and sediment export from macadamia farms, these are key areas for future management as part of this CMP.

2.4.2 Rocky Creek Dam Catchment Management Plan (Deere *et al.*, 2015)

The CMP follows a similar format to the Emigrant Creek CMP (Water Futures, 2013) covering the “catchment to treatment plant” component of the RCC water supply system.

The CMP describes the Rocky Creek Dam catchment as having no high-risk land uses or significant point pollution sources. Risks to water quality both now and in the future were identified as roads and recreational activities within the catchment and longer-term potential for the catchment to be degraded by development.

The focus of management for the catchment is on maintaining and protecting the catchment and water quality for the long term and preserving the undeveloped nature of the catchment. Review of the status of actions of the 2015 CMP completed as part of Stage 1, indicated that the majority of CMP actions are complete and on-going as part of normal RCC operating procedures involving effective collaboration with National Parks and Wildlife Service (NPWS) and other stakeholders (LCC, NSW Environmental Protection Authority - EPA, Rural Fire Service -RFS etc.). Bushfire management and assessing post-bushfire water quality risk was identified as an area requiring review and update in consultation with NPWS following the 2019 bushfires in the catchment (Appendix 1).

2.4.3 Pesticide Risk Assessment (under review)

RCC periodically reviews changing pesticide use in the catchments to ensure the effectiveness of the water testing program to ensure that the treatment of water delivers safe drinking water for the region’s residents. Previous reviews of the suitability of the water testing program, in terms of pesticide risk to drinking water, were undertaken over ten years ago. Since the previous reviews, there have been significant changes to land uses in the study area, and substantial changes to pesticide usage by varying land uses associated with increased understanding and uptake of integrated pest management, but also as a result of bans on the sale and use of previously popular insecticides such as endosulfan.

A review of the pesticide risk assessment has considered:

- Updated land use mapping.

- Stakeholder and industry consultation, and literature review to identify pesticide type, usage and pesticide properties.
- Derivation of risk of pesticide usage within the catchments associated with usage, pesticide properties and environmental characteristics such as slope, precipitation, soil type, erosivity and proximity to watercourses.
- Review of the suitability of RCC's pesticide monitoring program.
- Examination of alternative monitoring methods.
- Design of an intensive sampling program for future sampling.

This CMP refers to the updated pesticide risk assessment for catchment risks covered by that study.

2.5 Development of the Catchment Management Plan

2.5.1 Stage 1: Status of Existing RCC Catchment Management Plan (CMP) Actions

The initial stage of CMP development involved a detailed audit of previous Rous County Council (RCC) drinking water catchment management plans. The relevant management plans audited were:

- *Catchment Management Plan for Emigrant Creek Dam Catchment* (Acret *et al*., 2013).
- *Catchment Management Plan for Rocky Creek Dam Catchment* (Deere *et al*., 2015).
- *Wilsons River Catchment Management Plan* (Ecos Environmental, 2009).
- *Dunoon Dam Buffer Zone Strategic Plan* (Hydrosphere Consulting, 2009).

The status of the previous management actions documented in the above plans was compiled through review of background documentation, GIS mapping of catchment works and consultation with RCC staff including a workshop and follow up with the RCC natural resource management project team. A description of the actions implemented to date was provided along with discussion of past successes and failures and recommendations for future work to be considered in the development of this CMP. The *Status of Existing RCC Catchment Management Plan (CMP) Actions* report is provided as Appendix 1 of this CMP.

2.5.2 Stage 2 : RCC Catchment Drinking Water Risk Assessment 2020

Catchment Risk Assessments for each RCC drinking water source were updated based on background information, current knowledge and stakeholder consultation. Risk assessment workshops were held with key stakeholders to assist in the update of catchment information and current risk factors. The workshops were catchment specific, with four separate workshops held over two days on 23rd and 24th October 2019.

For each catchment (where applicable), hazard/hazardous event combinations were assessed across a number of catchment themes including on-site sewerage management, urban stormwater and sewage management, livestock, horticulture, contamination (e.g. spills, malicious events and contaminated land), roads, recreation, wildlife, natural geology and bushfire. For each identified hazard or hazardous event, the level of risk to drinking water supply was estimated to allow for prioritisation of risk and determination of any necessary additional management actions required to minimise risk to drinking water quality. The risk assessments are provided as Appendix 2 of this CMP.

3. RCC DRINKING WATER CATCHMENTS

This section describes the catchments and water sources from which RCC extracts raw water. It provides a snapshot of the broad risks to source water assessed as part of the Stage 2 Catchment Risk Assessment (Appendix 2) and current catchment management activities employed to manage risk.

3.1 Rocky Creek Dam Catchment

3.1.1 Catchment Description

The RCD catchment is located approximately 20km north of Lismore and covers an area of approximately 31km^2. The catchment is dominated by largely pristine forest protected within the Nightcap National Park and Whian Whian State Conservation Area, which together make up 85% of the catchment area (Figure 4). These areas are managed by the National Parks and Wildlife Service (NPWS). RCC also owns and manages a large area of land at the RCD reserve and has successfully established large areas of subtropical rainforest buffer zones around the dam comprising 7% of the catchment area. The remaining catchment is made up of the RCD waterbody (7.6%) and the water treatment plant (WTP) and associated infrastructure (0.3%).

3.1.2 Snapshot of Issues

There are no significant point or diffuse sources of pollution in the catchment. There are some minor access roads and recreational activities within the catchment associated with the National Park areas and the Rocky Creek Dam reserve. Key potential sources of risk to raw drinking water quality are summarised as:

- Recreational use – human waste enters watercourse from recreational activities (e.g. swimming) carrying harmful microbial pathogens.
- Wildlife - faecal matter from animals and birds contaminates water - including waterbirds perching on the offtake tower and horses which are permitted on parts of the road and trail network within the catchment.
- Roads - general road runoff (e.g. sediment, fuels, oils, brake fluids etc.).
- Bushfire – major bushfire occurs in the catchment followed closely by significant rainfall which transports pollutants (e.g. sediment, nutrients, organic matter, ash, metals and toxins) to the raw water supply.
- Hazmat spills - chemical spill enters watercourse/dam after truck/tanker road accident or during deliveries and unloading at the WTP.
- Malicious contamination - dangerous chemicals are deliberately placed in source water.
- Natural soils/geology - elevated iron and manganese exceed ADWGs due to naturally occurring soil/geology.

These potential risks were assessed as part of the risk assessment process considering the current management actions undertaken as outlined below.

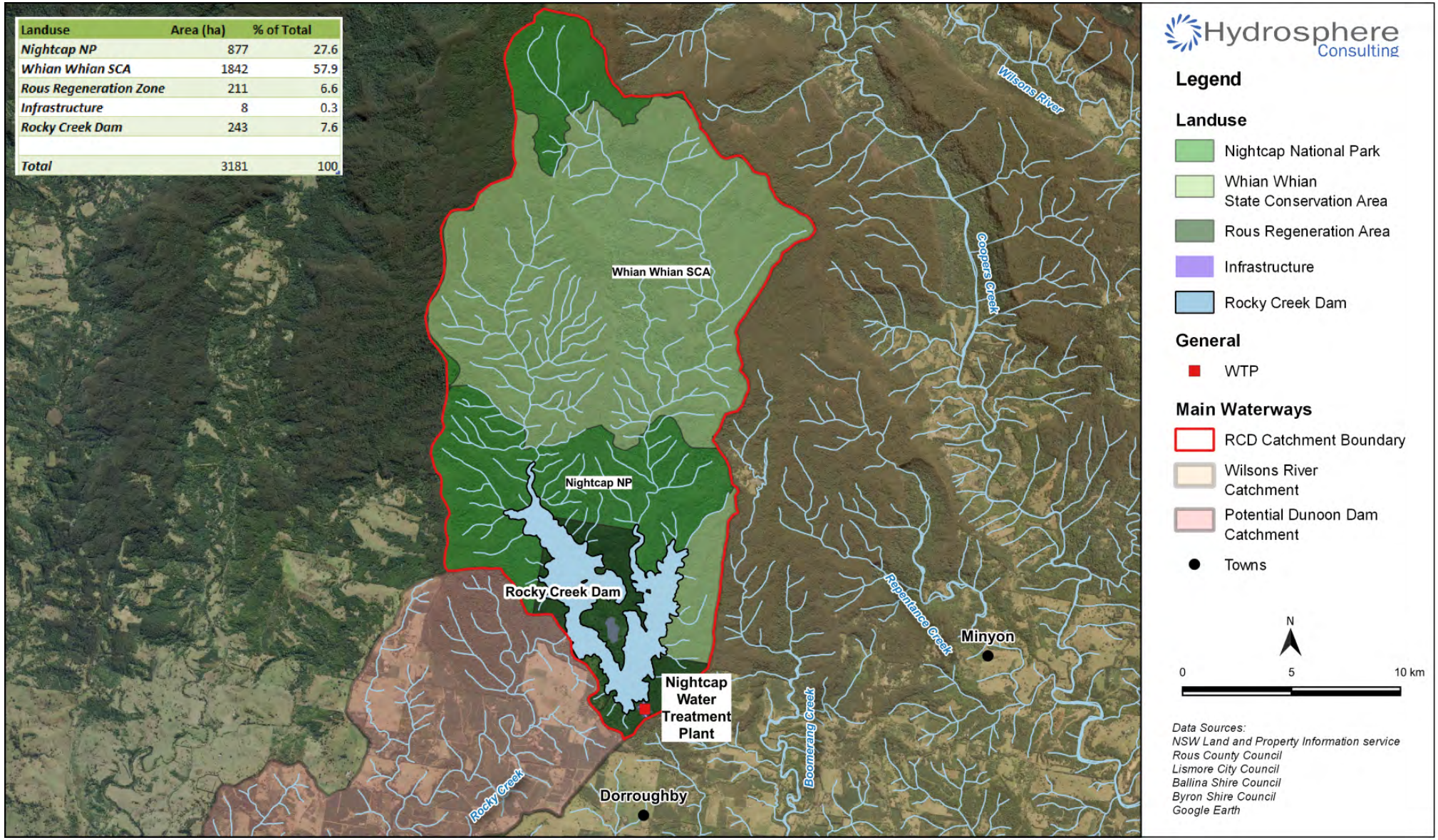

Figure 4: Rocky Creek Dam catchment land use

3.1.3 Current Management

The review of management actions currently in place to control known water quality risks in the RCD catchment was undertaken as part of Stage 1 (Appendix 1). Catchment management measures for RCD include:

- NPWS management of the majority of catchment areas contained within Nightcap National Park and Whian Whian State Conservation Area in accordance with NPWS Plans of Management including land stabilisation works, fire detection and response, recreational trail maintenance, management trails maintenance and feral animal control.
- Regular communications between RCC and NPWS to renew/update the Memorandum of Understanding (MOU) between NPWS and RCC for management and maintenance of land.
- Drinking water catchment signage at key locations to inform the public and provide call centre number to report spills etc.
- Limitations on human access (signage, very few roads, no access to watercourses, inspection and enforcement).
- On-going RCC and NPWS catchment surveillance activities.
- On-going fire detection and response by RCC and NPWS. Fire planning reviewed and updated annually by NPWS.
- Vegetated buffer zone along dam and watercourses maintained and enhanced.
- The use of herbicides within the catchment area by RCC or NPWS with strict adherence to best practice regulations. Chemical certification required for all RCC and NPWS contractors.
- Regular inspections and maintenance of the on-site sewage management (OSSM) system at the WTP.
- Hazmat spill response including capture, bunding and removal of contaminants. Option to shut off the plant whilst Hazmat experts assist with clean-up.
- Nightcap WTP stormwater drains have containment bunds and storage basins. Delivery and storage procedures are generally in accordance with regulations and on-going improvements are being planned and implemented. Incident response protocols in place under the RCC DWMS.
- Reservoir management undertaken by RCC in accordance with the RCC DWMS. The dam has a de-stratification (aeration) system which reduces conditions favoured by blue green algae and prevents the bottom of the dam becoming anaerobic.

Nightcap WTP treats water extracted from the dam before supply to RCC customers. Section 3.4.3 provides further details of the WTP and processes.

3.1.4 Risk Assessment Outcomes

The risk assessment undertaken as part of Stage 2 updated catchment risk levels and assessed the effectiveness of management actions currently in place. Table 1 summarises the high priority risks identified through the catchment risk assessment process. Refer Appendix 1 for full results.

Table 1: High priority risks to drinking water in the RCD catchment

Hazard type	Hazard	Source	Hazardous event
Biological	Bacteria, Protozoa and Viruses	Native and introduced wildlife	Faecal matter from animals and birds contaminates water – including waterbirds perching on the offtake tower.
Chemical	Iron	Natural geology	Iron concentrations exceed ADWGs in source water and cause aesthetic problems in water. This is likely to be due to naturally occurring soil/geology.
	Toxins (unknown contaminant)	Hazmat spills	Chemical spill enters watercourse after truck/tanker road accident or spill during delivery to WTP.
		Malicious contamination	Dangerous chemicals are deliberately placed in source water
		Bushfire	Major bushfire occurs in catchment and is followed closely by significant rainfall which transports pollutants (e.g. nutrients, organic matter, ash, metals and toxins) to raw water supply.
		Firefighting foams/retardants[1]	Bushfire response leading to foams and chemical runoff. Also risk of nutrients from phosphate based fire retardants if used.
Physical	Turbidity	Bushfire	Major bushfire occurs in catchment and is followed closely by significant rainfall which transports large amounts of sediment and ash to raw water supply.

1. Discussions with NPWS have indicated that firefighting foams and retardants are not used within National Park in the drinking water catchment areas, however the risk assessment took the precautionary approach and considered that use may occur in extreme circumstances and thus was assessed as a medium risk. However during the 2019 bushfire season fire retardants were used in the vicinity of the Nightcap WTP as a precaution to protect this asset during catastrophic fire danger conditions.

3.2 Wilsons River Source Catchment

3.2.1 Catchment Description

The WRS pumps water directly from the tidal pool of the Wilsons River approximately 5km upstream from Lismore (at Howards Grass). The catchment area exceeds 566km^2 and stretches from Upper Wilsons Creek and Upper Coopers Creek in the north to Byron Creek in the east (near Bangalow).

The dominant land use within the catchment is cattle grazing, comprising approximately 57% of the catchment (Figure 5). Horticultural activities comprise approximately 11% of the catchment and include macadamia, avocado, stone fruit, coffee plantations and other mixed horticultural crops. Run-off from the WRS catchment produces water with a high level of nutrient and sediment (Hydrosphere Consulting, 2015), particularly when the flow rates are either very high (in flood) or very low (in drought).

Urban stormwater and wastewater management also have the potential to affect raw water quality. There are over 3,555 OSSM systems in the catchment and approximately 20% of these have been assessed as high risk due to proximity to waterways and the WRS offtake (Ecos, 2009). The extraction point draws from the upper reaches of the tidal pool and is therefore subject to potential movement of water and contaminants from downstream of the intake, and impacts originating upstream within the Wilsons River and Coopers Creek catchments. These include water quality impacts associated with the major urban areas of Lismore and Bangalow both with treated sewage effluent discharge to waterways and stormwater networks (Figure 5). The WRS consists of a pump station abstracting up to 30ML/day of water (an average annual volume of 3,400ML) from the upper reaches of the tidal pool in the Wilsons River. Following abstraction, water is pumped 20km directly to Nightcap WTP for treatment and subsequent supply to consumers through existing water distribution infrastructure. The abstraction is subject to a licence issued by the NSW Government that regulates the circumstances under which the WRS can be operated.

3.2.2 Snapshot of Issues

The WRS catchment is an ‘open catchment’ meaning that the majority of the catchment area is in private ownership, with unrestricted access to the catchment (Ecos, 2009). The key risks to water quality were identified as:

- Runoff from urban land (e.g. stormwater pollution and sewer overflows).
- Runoff from agriculture (e.g. sediment, nutrient and pathogens etc.).
- Direct stock access to waterways.
- Stream bank erosion and slumping.
- Poor riparian vegetation.
- On-site wastewater disposal (e.g. septic tanks).
- Contaminated land and dip sites.
- Roads – general road runoff (e.g. sediment, fuels, oils, tyres, brake fluids etc.)
- Hazmat spills – chemical spill enters watercourse/dam after truck/tanker road accident or industrial accident.
- Malicious contamination – dangerous chemicals are deliberately placed in source water.
- Natural soils/geology – elevated iron and manganese exceed ADWGs due to naturally occurring soil/geology.

These potential risks were assessed as part of the risk assessment process considering the current management undertaken as outlined below.

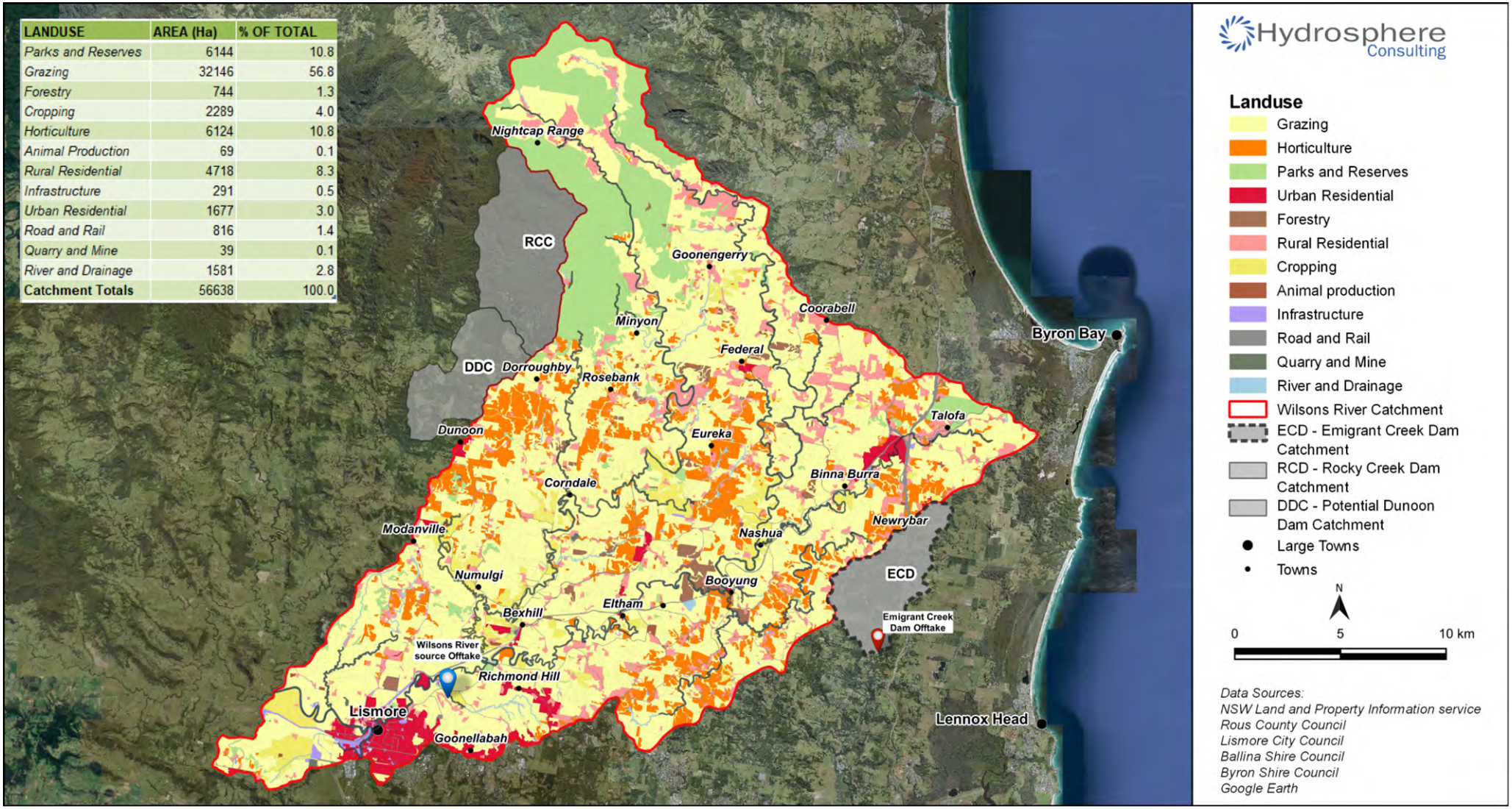

Figure 5: Wilsons River Source catchment land use

3.2.3 Current Management

The review of management actions currently in place to control known water quality risks in the WRS catchment was undertaken as part of Stage 1 (Appendix 1). Catchment management measures for WRS include:

- Drinking water catchment signage at key locations to inform the public and provide call centre number to report spills etc.
- On-going RCC catchment surveillance activities.
- Hazmat spill response including capture, bund, and removal of contaminants by first responders (e.g. RFS, NSW Fire and Rescue). RCC notification of incident by EPA to allow adaptive management and verification testing as necessary.
- Local council planning controls and regulation of OSSM systems.
- Stormwater management and improvement by local councils.
- River Reach Plans in the lower catchment in the vicinity of the WRS offtake including establishment of vegetated buffer zones, off-stream watering and fencing.
- RCC buffer zone establishment in the vicinity of the WRS offtake.
- On-going fire detection and response.
- In addition to these catchment controls there are turbidity limits on water extraction from the Wilsons River Source due to interference with treatment processes at Nightcap WTP.

Nightcap WTP treats water extracted from the WRS before supply to RCC customers. Section 3.4.3 provides further details of the WTP and processes.

3.2.4 Risk Assessment Outcomes

The risk assessment undertaken as part of Stage 2 updated catchment risk levels and assessed the effectiveness of management actions currently in place. Table 2 summarises the high priority risks identified through the catchment risk assessment process. Refer Appendix 1 for full results.

Table 2: High priority risks to drinking water in the WRS catchment

Hazard type	Hazard	Source	Hazardous event
Biological	Bacteria, Protozoa and Viruses	OSSM systems	Poor condition or poorly designed/constructed/ situated OSSM systems discharging harmful microbial pathogens to source water.
		Urban sewage	Human faecal matter from leaking sewage pipes discharging harmful microbial pathogens to source water.
		Livestock access to waterways	Livestock faeces directly entering waterways discharging harmful microbial pathogens to source water.

Hazard type	Hazard	Source	Hazardous event
Chemical	Iron	Natural geology	Iron concentrations exceed ADWGs in source water and cause aesthetic problems in water. This is likely to be due to naturally occurring soil/geology.
	Hydrocarbons	Hazmat spills	Fuel spill enters watercourse after vehicle road accident.
	Pharmaceuticals and EDCs	OSSM systems	Poor condition or poorly designed/constructed/ situated OSSM systems discharging effluent containing endocrine disruptors (e.g. hormones both natural and synthetic, pesticides etc.) or pharmaceuticals enters source water
		Livestock access to waterways	Excretion of veterinary products enters source water
	Toxins (unknown contaminant)	Hazmat spills	Chemical spill enters watercourse after truck/tanker road accident or spill during delivery to WTP.
		Malicious contamination	Dangerous chemicals are deliberately placed in source water.
		Bushfire	Major bushfire occurs in catchment and is followed closely by significant rainfall which transports pollutants (e.g. nutrients, organic matter, ash, metals and toxins) to raw water supply.
		Firefighting foams/ retardants	Bushfire response leading to foams and chemical runoff. Also risk of nutrients from phosphate based fire retardants if used
Physical	Taste and Odour	Suspended solids Algae	Concentrations exceed ADWGs in source water causes aesthetic water quality issues
	Turbidity	Stormwater	Urban development effects, such as increased hard surfaces and construction practices, leading to erosion and sediment transport during storm events leading to turbidity that may exceed ADWGs or treatment capacity.
		Road run-off	Runoff from unsealed roads enters source water carrying sediments and nutrients
		Bank erosion	Erosion of stream bed and bank mobilising sediments.
		Agricultural run-off	Runoff from areas of exposed soil enters watercourses carrying sediments.
		Livestock	Runoff from grazing land with elevated turbidity enters source water.

3.3 Emigrant Creek Dam Catchment

3.3.1 Catchment Description

The ECD catchment is located between Tintenbar and Knockrow, east of the Pacific Highway and north of the village of Newrybar. Emigrant Creek is a tributary of the lower parts of the Richmond River which has its estuary at Ballina.

The catchment covers an area of 19km^2 and is dominated by agricultural activities with rural residential and some tourist development, and the Pacific Highway. Macadamia farms make up the majority of horticultural land (45% of catchment) with some areas of stone fruit orchards, coffee and banana plantations, and small-scale vegetable growing. Cattle grazing comprises approximately 32% of the catchment, rural residential properties make up 12% of the catchment and roads including the Pacific Highway comprises over 6% of the total catchment area (Figure 6). Run-off from the catchment produces water with a high level of nutrient and sediment (Hydrosphere Consulting, 2015).

There are over 205 OSSM systems in the catchment and in 2011 BSC identified 37% of those were not operating properly or in accordance with BSC/RCC requirements. The village of Newrybar contains the greatest concentration of OSSM systems in the catchment.

Water is extracted from ECD and treated at the ECD WTP before supply to consumers through existing water distribution infrastructure.

3.3.2 Snapshot of Issues

The ECD catchment is the smallest of all RCC's drinking water catchments, however like the WRS, the majority of the catchment area is in private ownership, with unrestricted access. The key risks to water quality were identified as:

- Runoff from agriculture (e.g. sediment, nutrient and pathogens etc.).
- Direct stock access to waterways.
- Stream bank erosion and slumping.
- Poor riparian vegetation.
- On-site wastewater disposal (e.g. septic tanks).
- Contaminated land and dip sites.
- Roads – general road runoff (e.g. sediment, fuels, oils, brake fluids etc.)
- Hazmat spills – chemical spill enters watercourse/dam after truck/tanker road accident or industrial accident.
- Malicious contamination – dangerous chemicals are deliberately placed in source water.
- Natural soils/geology – elevated iron and manganese exceed ADWGs due to naturally occurring soil/geology.
- Algal growth and potentially toxic species of blue green algae are occasional issues in ECD.
- Carp are also observed throughout the system including ECD and are believed to cause benthic sediment disturbance which may facilitate greater nutrient release from sediment and increase turbidity.

These potential risks were assessed as part of the risk assessment process considering the current management undertaken as outlined below.

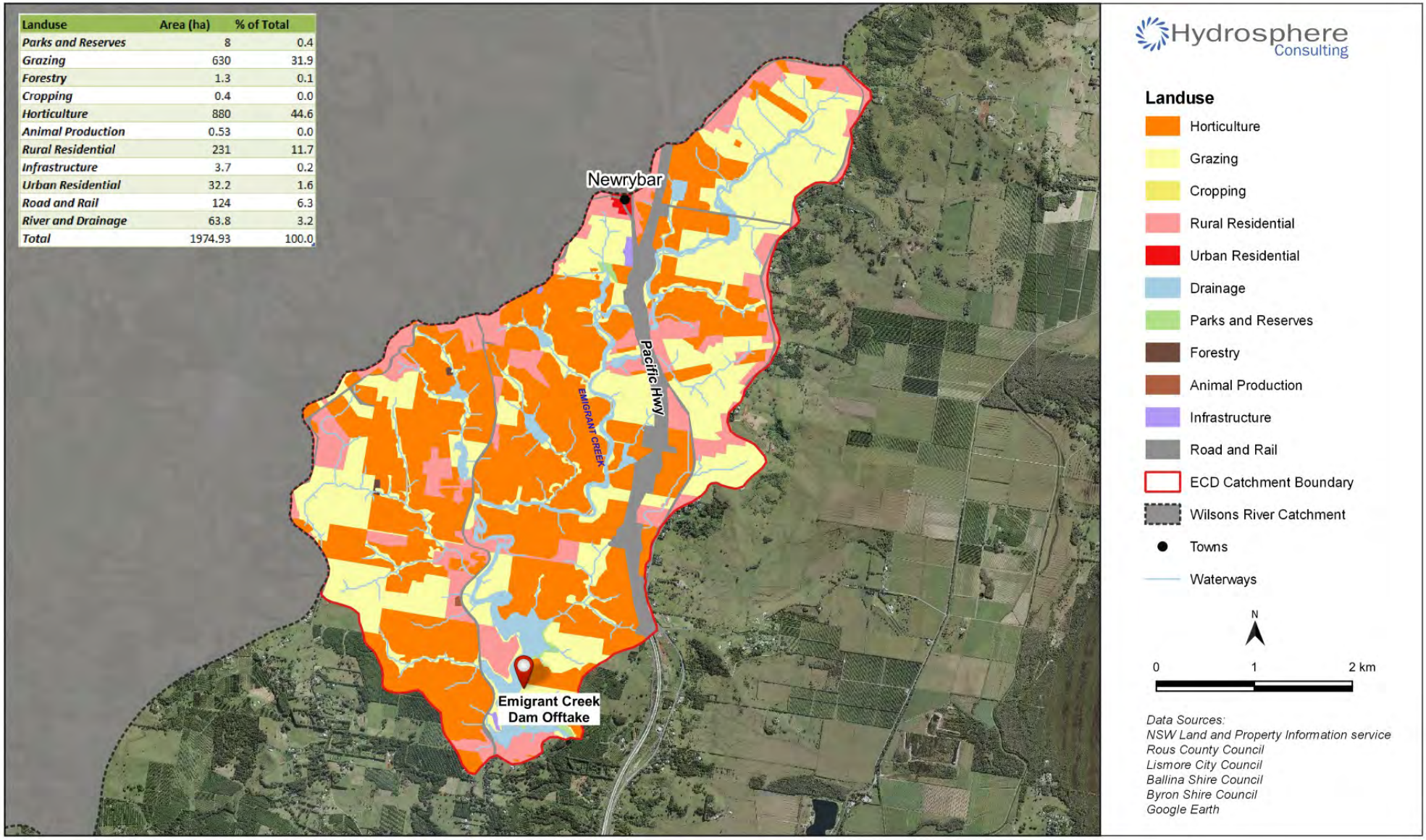

Figure 6: Emigrant Creek Dam catchment land use

3.3.3 Current Management

The review of management actions currently in place to control known water quality risks in the ECD catchment was undertaken as part of Stage 1 (Appendix 1). Catchment management measures for ECD include:

- Drinking water catchment signage at key locations to inform the public and provide call centre number to report spills etc.
- On-going RCC catchment surveillance activities.
- Hazmat spill response including capture, bund, and removal of contaminants by first responders (e.g. RFS, NSW Fire and Rescue). RCC notification of incident by EPA to allow adaptive management and verification testing as necessary.
- BSC planning controls and regulation of OSSM systems.
- River Reach Plans in the lower catchment upstream of ECD including establishment of vegetated buffer zones, and erosion control.
- RCC buffer zone establishment and maintenance around ECD.
- On-going fire detection and response.

In addition to these catchment controls there are turbidity limits on water extraction from ECD due to interference with treatment processes at ECD WTP.

ECD WTP treats water extracted from the dam before supply to customers in Lennox Head and Ballina. Section 3.4.3 provides further details of the WTP and processes.

3.3.4 Risk Assessment Outcomes

The risk assessment undertaken as part of Stage 2 updated catchment risk levels and assessed the effectiveness of management actions currently in place. Table 3 summarises the high priority risks identified through the catchment risk assessment process. Refer Appendix 1 for full results.

Table 3: High priority risks to drinking water in the ECD catchment

Hazard type	Hazard	Source	Hazardous event
Biological	Bacteria, Protozoa and Viruses	OSSM systems	Poor condition or poorly designed/constructed/ situated OSSM systems discharging harmful microbial pathogens to source water.
		Livestock access to waterways	Livestock faeces directly entering waterways discharging harmful microbial pathogens to source water.
	Problem Algae/aquatic weeds	OSSM systems	Poor condition or poorly designed/constructed/ situated OSSM systems discharging nutrient-rich effluent to source water
		Fertiliser	Fertiliser use that results in transport of excess nutrient to waterways through groundwater or surface water runoff (e.g. application rates too high or timing coincides with rainfall and runoff events etc.)
		Livestock	Nutrient-rich runoff from grazing land enters source water
		Livestock access to waterways	Livestock faeces directly entering waterways contribute nutrients directly to source water

Hazard type	Hazard	Source	Hazardous event
Chemical	Iron	Natural geology	Iron concentrations exceed ADWGs in source water and cause aesthetic problems in water. This is likely to be due to naturally occurring soil/geology.
	Hydrocarbons	Hazmat spills	Fuel spill enters watercourse after vehicle road accident.
	Pesticides	Agricultural pesticide use	Pesticides enter source water either directly (i.e. spray drift) or indirectly (i.e. in run-off)
	Pharmaceuticals and EDCs	OSSM systems	Poor condition or poorly designed/constructed/ situated OSSM systems discharging effluent containing endocrine disruptors (e.g. hormones both natural and synthetic, pesticides etc.) or pharmaceuticals enters source water
		Livestock access to waterways	Excretion of veterinary products enters source water
	Toxins (unknown contaminant)	Hazmat spills	Chemical spill enters watercourse after truck/tanker road accident or spill during delivery to WTP.
		Malicious contamination	Dangerous chemicals are deliberately placed in source water.
		Bushfire[1]	Major bushfire occurs in catchment and is followed closely by significant rainfall which transports pollutants (e.g. nutrients, organic matter, ash, metals and toxins) to raw water supply.
		Firefighting foams/ retardants	Bushfire response leading to foams and chemical runoff. Also risk of nutrients from phosphate based fire retardants if used
Physical	Taste and Odour	Suspended solids Algae	Concentrations exceed ADWGs in source water causes aesthetic water quality issues
	Turbidity	Road run-off	Runoff from unsealed roads enters source water carrying sediments and nutrients
		Bank erosion	Erosion of stream bed and bank mobilising sediments.
		Agricultural run-off	Runoff from areas of exposed soil enters watercourses carrying sediments.
		Livestock	Runoff from grazing land with elevated turbidity enters source water.
		Carp	Exotic fish causing benthic sediment disturbance which may facilitate greater nutrient release from sediment

1. While there are only small tracks of natural bushland classified as bush fire prone land within the ECD catchments, Macadamia orchards occupy approx. 45% of the catchment and are known to be highly flammable due to high oil content. For these reasons bushfire was considered a priority risk.

3.4 Potential Dunoon Dam Catchment

Dunoon Dam was first identified as a potential water source in 1995. The proposal involves the construction of a new dam on Rocky Creek, 14.6 river km downstream of the existing RCD and approximately 2.5km west of the village of Dunoon. Potential storage would be approximately 50,000ML at a full supply level of 85mAHD and have a surface area of approximately 220ha. Water from DD would be pumped to the Nightcap WTP and subsequently used for town water supply throughout the RCC service area. Currently, this option is being assessed among a range of other future water supply options, however, RCC has previously purchased land within the catchment as part of preliminary planning.

3.4.1 Catchment Description

The proposed DD has a catchment area of approximately 19km^2. Dunoon Dam would also receive overflows from RCD and therefore when RCD is spilling, the DD catchment area also incorporates the RCD catchment, giving a total catchment area of 50km^2. For the purposes of this CMP, the potential DD catchment is assumed to start downstream of RCD. Figure 7 provides an overview of mixed land use in the catchment. RCC currently owns several parcels of land within the DD catchment and would seek to purchase the remaining land within the buffer zone surrounding the dam, should this option be implemented for future water supply. The remaining catchment areas are either protected as parks and reserves or are under private ownership. Whian Whian Falls is a popular existing recreational location with easy access from the public road. If constructed, the upstream extent of DD would be just downstream of the base of the falls. Currently, cleared grazing land makes up approximately 40% of the catchment, horticulture (primarily macadamia farms) occupy 30%, and approximately 18% of the catchment is classified as Parks and Reserves (the majority of which is within Nightcap National Park). The remaining land uses comprise rural residential lots (4.6%), cropping (2.2%), forestry (1.3%) and rivers and drainage channels (4.4%).

3.4.2 Snapshot of Issues

The key risks to water quality were identified as:

- Recreational use – human waste enters watercourse from recreational activities (e.g. swimming) carrying harmful microbial pathogens.
- Wildlife – faecal matter from animals and birds contaminates water.
- Roads – general road runoff (e.g. sediment, fuels, oils, brake fluids etc.)
- Bushfire – major bushfire occurs in catchment and is followed closely by significant rainfall which transports pollutants (e.g. sediment, nutrients, organic matter, ash, metals and toxins) to raw water supply.
- Malicious contamination – dangerous chemicals are deliberately placed in source water.
- Natural soils/geology – elevated iron and manganese exceed ADWGs.
- Runoff from agriculture (e.g. sediment, nutrient and pathogens etc.).
- Direct stock access to waterways (e.g. nutrient and pathogens etc.).
- Stream bank erosion and slumping.
- Poor riparian vegetation.
- On-site wastewater disposal (e.g. septic tanks).
- Contaminated land and dip sites.

These potential risks were assessed as part of the risk assessment process considering the current management undertaken as outlined below.

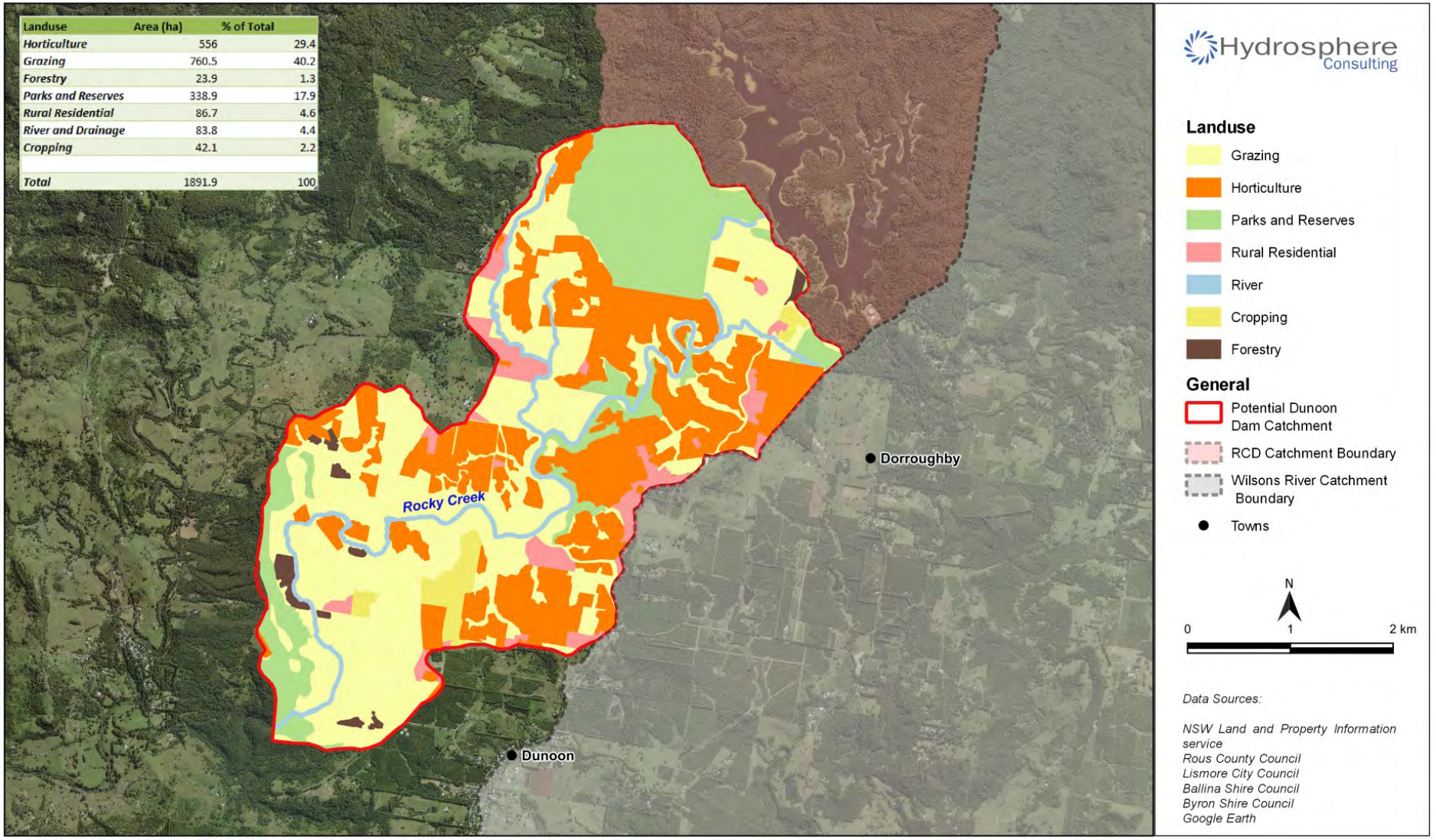

Figure 7: Potential Dunoon Dam catchment showing existing land use

3.4.3 Current Management

The review of management actions currently in place to control known water quality risks in the DD catchment was undertaken as part of Stage 1 (Appendix 1). RCC Catchment management measures are currently restricted to land management on RCC owned estate to maintain the land and typically comprise weed management activities and on-going RCC catchment surveillance activities.

3.4.4 Risk Assessment Outcomes

The risk assessment for the DD catchment was theoretical as it assumed the dam was already built with treatment at Nightcap WTP. This allowed for a comparative assessment of catchment risks to future water supply, if a new dam is constructed in this catchment. Table 4 summarises the high priority risks identified through the catchment risk assessment process. Refer Appendix 1 for full results.

Table 4: Potential Dunoon Dam drinking water risk assessment summary of results

Hazard type	Hazard	Source	Hazardous event
Biological	Bacteria, Protozoa and Viruses	Recreation	Human waste enters watercourse from recreational activities carrying pathogens
Chemical	Iron	Natural geology	Iron concentrations exceed ADWGs in source water and cause aesthetic problems in water. This is likely to be due to naturally occurring soil/geology.
	Hydrocarbons	Hazmat spills	Fuel spill enters watercourse after vehicle road accident.
	Pharmaceuticals and EDCs	OSSM systems	Poor condition or poorly designed/constructed/ situated OSSM systems discharging effluent containing endocrine disruptors (e.g. hormones both natural and synthetic, pesticides etc.) or pharmaceuticals enters source water
		Livestock access to waterways	Excretion of veterinary products enters source water
	Toxins (unknown contaminant)	Hazmat spills	Chemical spill enters watercourse after truck/tanker road accident.
		Malicious contamination	Dangerous chemicals are deliberately placed in source water
		Bushfire	Major bushfire occurs in catchment and is followed closely by significant rainfall which transports pollutants (e.g. nutrients, organic matter, ash, metals and toxins) to raw water supply.
		Firefighting foams/retardants	Bushfire response leading to foams and chemical runoff. Also risk of nutrients from phosphate based fire retardants if used
Physical	Turbidity	Road run-off	Runoff from unsealed roads enters source water carrying sediments and nutrients
		Agricultural run-off	Runoff from areas of exposed soil enters watercourses carrying sediments.
		Livestock	Runoff from grazing land with elevated turbidity enters source water.

3.5 Water Treatment

Water from RCD and the WRS is treated at the Nightcap WTP. Water from ECD is treated at the Emigrant Creek Dam WTP. A description of WTP processes is provided below.

3.5.1 Nightcap Water Treatment Plant

Water from RCD and the WRS is treated at the Nightcap WTP. The plant is situated beside RCD, 200m above sea level in the Nightcap Range. Water from the Wilsons River does not enter Rocky Creek Dam but is piped separately into the plant.

Nightcap WTP was built in 1994 with major upgrades in 2000, 2006 and 2008. The plant utilises conventional processes together with advanced ozone and activated carbon treatment. It has a current capacity of 70ML/day with provision to upgrade to 100ML/day if required in the future. Table 5 and Figure 8 identify the series of processes used to remove pollutants from source water.

Table 5: Nightcap WTP treatment process

Process Step	Description	Purpose
Destratification	Aeration system within the dam	Prevent roll over and reduce conditions favoured by blue green algae and prevents the bottom of the dam becoming anaerobic.
Raw water	Pumped from RCD or WRS to the Nightcap WTP.	Raw water collection.
Chemical dosing	Hydrated lime and CO_2.	Buffer against changes in pH and prepare for coagulation.
Coagulation and flocculation	Alum and polyelectrolyte flash mixed prior to six two-stage flocculation tanks.	Formation of flocs.
Dissolved air floatation/filtration (DAFF)	Floc floats to surface to form a sludge, which is skimmed off and sent for further treatment. Deep sand filtration.	Removal of flocs and coagulant chemicals.
Ozone contact tank	Ozone generation on-site. Oxidation and breakdown of organic material. Ozone destruction.	Primary disinfection, destruction/ inactivation of pathogenic organisms. Breakdown of taste and odour compounds, algal toxins, pesticide and herbicides.
Biologically activated carbon (BAC)	Filtration through adsorption and biological degradation.	Removal of nitrates, taste and odour compounds, algal toxins, pesticide and herbicides.
pH correction	Hydrated lime dosing.	Meet ADWG standards for drinking water.
Chlorination	Sodium hypochlorite dosing.	To ensure a chlorine residual to manage deterioration of water in the distribution network.
Wastewater processing	Sludge and backwash water thickening and clarified. Clarified supernatant is sent to the head of the plant. Dewatered sludge is trucked for disposal or reuse offsite.	Treatment and disposal of waste products.

Source: Adapted from Deere *et al.* (2015)

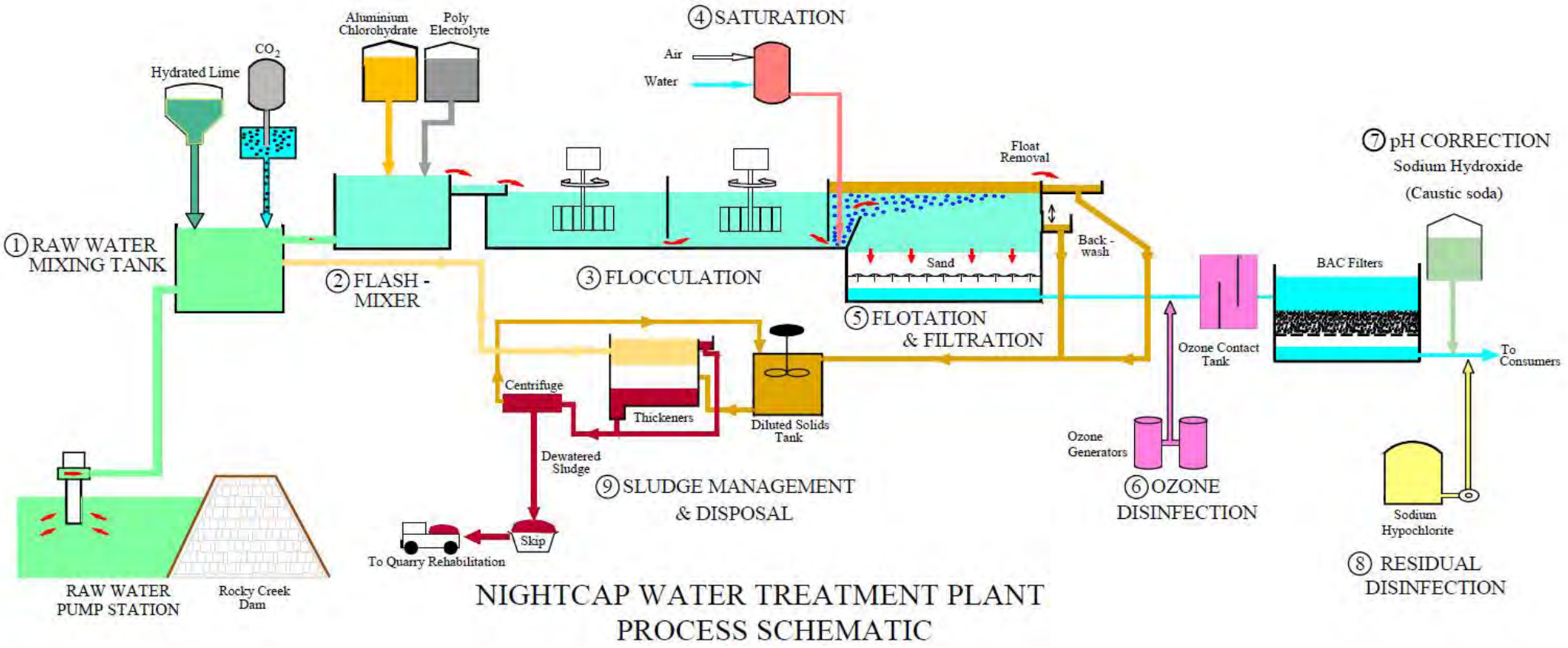

Figure 8: Schematic diagram of the Nightcap WTP process

Source: Hydrosphere Consulting (2017)

3.5.2 Emigrant Creek Water Treatment Plant

Water from ECD is treated at the Emigrant Creek WTP. The plant is situated beside ECD, approximately 70m above sea level at Knockrow, approximately 7km inland from Lennox Head.

Emigrant Creek WTP was built in 2005, replacing the Knockrow filtration plant. The plant utilises membrane filtration technology together with advanced ozone and activated carbon treatment. It can process up to 7.5ML/day and supplements water from Nightcap WTP to supply the Lennox Head and Ballina areas (RCC, 2019a). Table 6 and Figure 9 identify the series of processes used to remove pollutants from source water.

Table 6: Emigrant Creek WTP treatment process

Process Step	Description	Purpose
Destratification	Aeration system within the dam	Prevent roll over and reduce conditions favoured by blue green algae and prevents the bottom of the dam becoming anaerobic.
Raw water	Pumped from ECD to the WTP	Raw water collection.
Chemical dosing	Potassium permanganate added. Lime is then added to the water to raise the alkalinity	Remove iron and manganese. Buffer against changes in pH and prepare for coagulation.
Raw Water Balance Tank	The 'dosed' raw water passes through the balance tank	Allow for reaction time and for the water to stabilise before further treatment.
Chemical dosing	CO_2 and coagulant added	Formation of flocs.
Membrane Filtration Plant	Water passes through microscopic membrane filters	Removal of solids and microscopic organisms including bacteria, Cryptosporidium and Giardia, improve colour and eliminate odour.
Filtered Water Tank	The filtered water passes through the filtered water tank	Allow for the water to stabilise before further treatment.
Ozone contact tank	Ozone generation on-site. Oxidation and breakdown of organic material. Ozone destruction.	Primary disinfection, destruction/inactivation of pathogenic organisms. Breakdown of taste and odour compounds, algal toxins, pesticide and herbicides.
Biologically activated carbon (BAC)	Filtration through adsorption and biological degradation.	Removal of nitrates, taste and odour compounds, algal toxins, pesticide and herbicides.
Final pH correction	Caustic soda dosing	Meet ADWG standards for drinking water.
Chlorination	Sodium hypochlorite dosing.	Further correct the water properties and kill any bacteria or micro-organisms that may be in the water To ensure adequate chlorine residual to manage deterioration of water in the distribution network.

Process Step	Description	Purpose
Clearwater Balance Tank	Treated water passes through balance tank	Allow detention for disinfection to take place.
Knockrow Reservoir	Potable water is pumped to Knockrow reservoir	Storage and distribution to the community.
Wastewater processing	Sludge and backwash water thickening and clarified. Clarified supernatant is sent to the head of the plant. Dewatered sludge is trucked for disposal or reuse offsite.	Treatment and disposal of waste products.

Source: Adapted from Water Futures (2013)

Plate 1: Membrane filtration chambers at Emigrant Creek Dam WTP, October 2019.

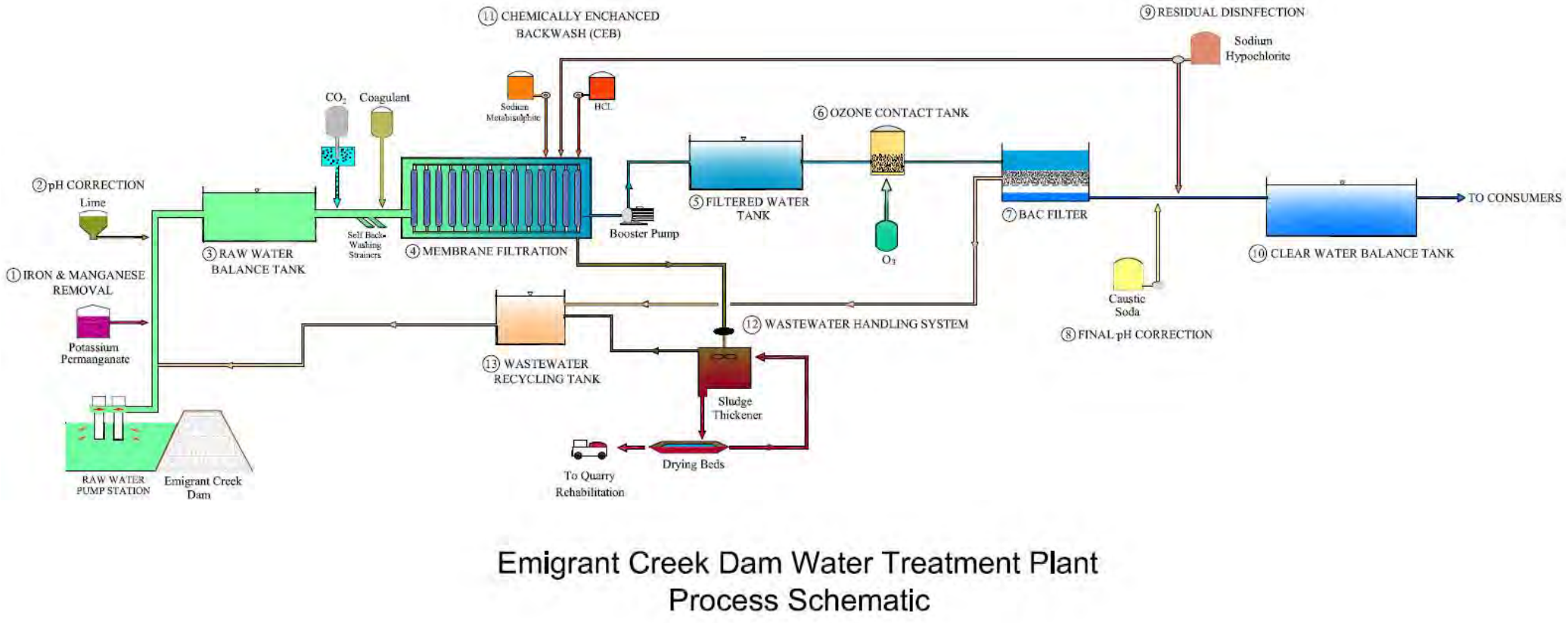

Figure 9: Schematic diagram of the ECD WTP process

Source: Hydrosphere Consulting (2017)

4. OVERVIEW OF CATCHMENT MANGEMENT APPROACH

The overall catchment management approach (Figure 10) outlines the key elements required to minimise water quality risks in the RCC drinking water catchments.

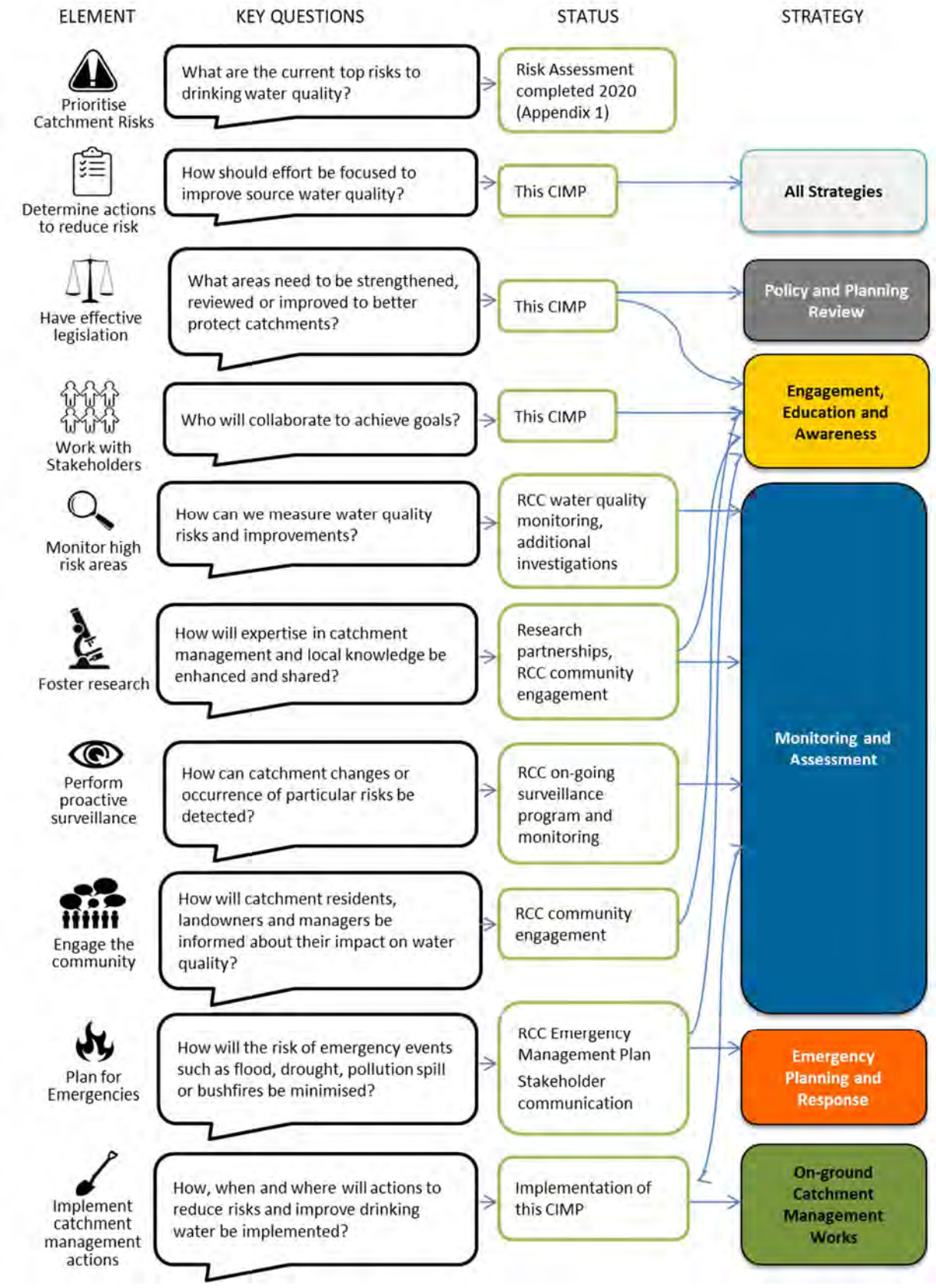

Figure 10: Elements of RCC catchment management

5. CATCHMENT STRATEGIES AND ACTIONS

Actions have been organised into five key strategies for implementation as shown in Table 7. All strategies have elements that are applicable to all catchments. Strategies 1-3 contain engagement, planning and emergency response actions generally applicable to all catchments. Strategy 4 Monitoring Evaluation and Reporting and Strategy 5 On-ground Catchment Management Works contain catchment specific actions for on-ground implementation at key locations.

Table 7: Key strategies for catchment management implementation

No.	Strategy	Description
1	Engagement, Education and Awareness	On-going promotion/education and awareness building of catchment risks, stakeholder responsibilities and ways to reduce risks to drinking water. Builds on existing RCC engagement activities and communicates current research and approaches.
2	Planning and Policy Review	Review and update of guidelines, policy and approval processes that impact on drinking water catchments (e.g. OSSM guidelines, development applications and DCPs etc.)
3	Emergency Planning and Response	Incorporates actions for review of emergency responses including procedures for Hazmat clean up and refining notifications, bushfire mitigation etc.
4	Monitoring Evaluation and Reporting	On-going water quality monitoring and catchment surveillance activities to assess risk, monitor changes and identify emerging issues. Investigation of specific risks to better understand the nature of the issue and determine actions required.
5	On-ground Catchment Management Works	Catchment remediation and rehabilitation works including River Reach Plan implementation and extension, farm-based erosion management plans and continuing buffer zone establishment and maintenance.

Actions have been developed from the outcomes of *Stage 1 Status of Existing RCC Catchment Management Plan (CMP) Actions* (Appendix 1) and *Stage 2 Drinking Water Catchments Risk Assessment 2020* (Appendix 2). Some actions, such as River Reach Plan extensions require an audit of completed work and condition assessment of new reaches prior to implementation of on-ground works. This is to ensure the appropriate effort, funding and geographical focus of on-ground works is undertaken.

Management strategies and actions have been developed for a five-year period. This CMP and the progress of the management actions should be reviewed annually and at the end of this period to ensure the actions remain relevant and the goals of the plan are being achieved.

The recommended management actions have been described in terms of:

- Desired outcome – the specific result to be achieved by implementation of each action.
- Priority ranking – each action has been assigned a rank and priority according to importance and urgency for implementation. The ranking is based on combined risk assessment outcomes. The priority categories have been assigned according to descriptions in Table 8.

Table 8: Priority Ranking

Priority	Description
Fundamental	Actions that are critical for successful implementation of the CMP and important for long-term effective catchment management
High	Actions of high importance in addressing key threats and issues
Medium	Actions considered of medium importance in addressing threats and issues
Low	Actions considered of low importance in addressing threats and issues relative to other issues

- Description of tasks – an outline of the scope of works required.
- Responsibility – RCC is the lead organisation for all actions and is responsible for implementation of the CMP. Support Organisation(s) may be required and/or requested to assist in implementation of the action, either through on-ground works, or as a potential funding or information source, but are not necessarily critical to success.
- Cost estimate – an estimate of total costs for implementation over the five year life of the plan is provided (2020$). Section 8 provides a breakdown of action costs. Cost estimates cover the tasks listed in the actions (including preliminary investigations, environmental assessment, approvals and implementation) unless otherwise stated. Cost estimates provided in the action descriptions are preliminary only and are based on the best available information.
- Staff time estimate - the RCC staff resources associated with implementation of the identified strategies and actions have been estimated in terms of Equivalent Full Time (EFT) workload per year and is shown for every action.
- Potential funding – the CMP actions are expected to be funded through RCC catchment management budgets, monetary grants, staff time and contributions from catchment stakeholders (refer Section 6 for examples). Identification of grants and successful application is an important component of this CMP. A summary of funding sources is provided in Section 6.
- Timing – indicative timeframe for implementation and alignment with RCC's four year Delivery Program (DP) under the NSW Integrated Planning and Reporting (IP&R) Framework. Based on the priorities developed in this CMP, timeframes for management actions have been estimated, pending funding availability. The assumed start date for CMP implementation is 1 July 2020, following RCC adoption of the Plan. The CMP has a planning timeframe of five years therefore the duration of the Plan implementation period is from 1 July 2020 to 30 June 2025. Management actions have been scheduled according to the following timeframes:
    - Short term: year 1 – 2 (2021 – 2022).
    - Medium term: year 3 – 4 (2023 – 2024).
    - Long term: year 4 – 5 (2024 – 2025).
    - On-going: starting year 1 and implemented over the five year life of the CMP with possible extension beyond that period.
- Location – location of actions within catchments as applicable.
- Performance targets – performance targets for each action which can be used to measure the level of success.

6. FUNDING AND RESOURCES

The CMP actions are expected to be funded through RCC catchment management budgets, monetary grants and volunteer works by community members and organisations.

Some actions are funded under RCC's normal operating budgets throughout the five-year period, or through existing programs and grants. Where actions require RCC staff resources, actual costs have only been applied where it is expected that implementation will exceed current resourcing levels, in which case, additional funding is required. All actions will be supported by the day-to day project supervision of the RCC Natural Resource Management Planning Coordinator and the Natural Resource Officer. These staffing resources are funded through recurrent staffing costs that are already included in the Long Term Financial Plan so there is no additional staffing resources/costs associated with this aspect of the program.

RCC operates on an annual budget primarily funded through water rates and charges as well as fees and operating grants. It will not be possible for RCC to implement all actions identified in this CMP without additional sources of funding. As such, identification of grants and the submission of successful funding applications is an important component of this CMP. A list of current possible sources of external federal, state and local funding is provided below. However, it is important to note that many grants and funding sources change year to year, are only available up to a limited budget, or require significant co-funding commitment. It is also important to note that accurate estimates of project costs, particularly for on ground works cannot be accurately developed until audit and planning tasks have been completed, with these tasks often incurring significant costs. It will be necessary to keep abreast of current funding availability throughout the implementation of the CMP and take advantage of funding opportunities as they arise. In each case, the precise amount of funding available will not be known until it has been awarded.

Delivery of the actions will depend on the availability of funding which is yet to be confirmed. Despite the priority of each action listed in the CMP, the timeframe of implementation will be influenced by the availability of resources and funding.

Key sources of funding identified for the CMP actions are:

- RCC funds – generated through constituent council contributions and operating grants. It should be noted that RCC will typically not lodge funding applications for grants of less than $20,000 due to the administration and project management loading associated with small grants.
- NSW Health Drinking Water Monitoring Program – NSW Health recommends that water suppliers monitor water quality in line with the ADWGs. NSW Health provides free of charge testing for water supply system monitoring for pesticides, indicator bacteria and health-related inorganic chemicals. All the data from the sampling undertaken within the Drinking Water Monitoring Program is stored in the Drinking Water Database. NSW Health laboratories provide free analysis for the allocated number of samples.
- The NSW Environmental Trust – administered by NSW Department of Planning Industry and Environment (DPIE) to fund a broad range of projects which enhance the environment of NSW. Relevant streams include environmental education, protecting our places (for the sharing and protection of Aboriginal Cultural knowledge and the protection, restoration and enhancement of culturally significant Aboriginal Land), research, restoration and rehabilitation projects and waste avoidance and resource recovery.
- Hort Innovation funding – Hort Innovation invests more than $100 million each year into initiatives and programs that provide benefit to Australian horticulture growers, the wider horticulture sector and the community. Proposals can be submitted to Hort Innovation via an online submission form.

- DPIE – Crown Lands:
    - Crown Reserves Improvement Fund Program for development and maintenance projects and to improve land and facilities on Crown land. Funding under this program is subject to a competitive grant application process and eligibility requirements which may change from year to year and in accordance with departmental priorities.
- Human resources and contributions may also be required from:
    - Constituent councils – LCC, BSC and BySC.
    - NPWS through maintenance and management of National Parks and Reserves in collaboration with RCC.
    - DPIE – Crown Lands.
    - DPI – Fisheries.
    - RMS.
    - North Coast Local Land Services (LLS).
    - Landcare and other volunteer and community groups.
    - Educational and research institutions.

Where actions are being sufficiently implemented through an on-going concurrent program, additional expenditure and funding have not been included.

7. CATCHMENT MANAGEMENT PLAN ACTIONS

A targeted management plan has been prepared to document prioritised management actions based on catchment risk. Proposed actions are those deemed to be affordable, have tangible benefit and contribute to the long-term vision for management of the RCC drinking water catchments. Prior to inclusion of an action, it was critically evaluated to ensure that it can be effectively implemented, taking into consideration the limitations imposed by responsibilities, funding, environmental conditions and community support.

The extent to which catchment pollution can be controlled or remediated is often limited in practical terms where land is not under the direct control of RCC. On-ground works on RCC owned land in the vicinity of the raw water off-takes and dam buffer zones are the highest priority and this work is on-going as part of RCC operational budgets. This CMP proposes additional actions to be implemented on private land through the extension of River Reach Plans to better protect catchments and focus on identified risks to drinking water quality.

Effective catchment management also requires effective collaboration between a range of stakeholders including RCC, local governments, state government agencies and regulators, the agricultural sector, landowners and the community. All catchment stakeholders have a role to play from regulation, development control, land management and wastewater management to riparian improvement. During Stage 1, it was identified that a number of actions in previous catchment management plans were incomplete or their status was unknown due to those actions being outside of the direct control of RCC. This CMP focuses on those actions under the direct control of RCC, while continuing to work with catchment stakeholders and collaborating wherever potential overlaps exist. To facilitate collaborative efforts this CMP sets a clear division of responsibilities between RCC and other stakeholders. This is defined for each action by providing a list of 'Support Organisation(s)' as applicable. RCC is the lead organisation for all actions in this CMP. Several actions in the CMP require specific consultation and collaboration with a range of stakeholders in addition to the on-going communication between RCC and stakeholders as part of everyday operations.

Plate 2: Emigrant Creek Dam

Source: RCC (2017)

7.1 Actions Applicable to all Catchments

7.1.1 Strategy 1: Engagement, Education and Awareness

RCC implements a range of community awareness projects across all catchments aimed at enhancing community understanding of the value of water. Community awareness programs should be continued and built upon to increase community awareness of issues and responsibilities of all stakeholders in the protection of drinking water quality. Diffuse sources of pollution arising from agricultural activities and stormwater pollution are difficult to manage but their effect on water quality can be minimised by increasing awareness of impacts and the use of best practice management. Landowners and residents can be encouraged to protect water quality through community awareness programs. The following actions have been identified as specific areas of focus for the future engagement, education and awareness program.

Plate 3: Examples of RCC engagement materials and activities

Source: www.rous.nsw.gov.au

Action A1: Catchment Landholder Education and Awareness

Desired Outcome	On-going promotion/ education and awareness building concerning the impact of catchment activities on drinking water quality and the role of all catchment stakeholders in protecting catchments
Priority ranking	High
DESCRIPTION OF TASKS:	
1. Educational materials: Continue to promote and distribute existing educational materials (e.g. *Landholders guide to looking after waterways in the Richmond Catchment* (booklet) (RCC, 2017); *My Local Native Garden Guide* (RCC and LCC, 2016); *NSW Weed Control Handbook* (DPI, 2018); and industry Best Practice Management Guidelines. 2. Targeted extension and awareness programs: Continue engagement activities and community events including: Primary and secondary school education programs; RCC Catchment Trailer display; Big Scrub Rainforest Day; Primex display; World Environment Day Tree Planting; Clean Up Australia Day etc. 3. Spills and contamination: On-going promotion/education and awareness building concerning water quality risks associated with spills and incidents. This includes: a. Maintain current actions including: drinking water catchment signage with contact number to report all spills; and stormwater stencilling etc. b. Engagement and awareness activities including promotion of ChemClear and DrumMuster Programs which provide a safe disposal path for unwanted agricultural chemicals. 4. Water quality information: Communicate results of water quality investigations (refer Action A5: RCC Catchment Water Quality Monitoring Program) through publication on RCC website, email notifications and media release. 5. Liaise with LCC regarding progress to implementation of Lismore Urban Stormwater Management Plan 2016. 6. Catchment landholder welcome pack: Provide a 'welcome pack' to new residents in RCC drinking water catchments providing background information and advising of their new responsibilities. This initiative would target landholders at the outset of their ownership of a property within a drinking water catchment. Tasks include: a. Confirm welcome pack contents including welcome letter, educational materials and contact details for further information. Existing educational materials such as those discussed in no. 1 above are considered suitable and should be tailored to the location of the property in the catchment (e.g. rural packs to include information on OSSM system operation and agricultural best practice; urban packs to contain information about stormwater pollution and chemical/pesticide use in gardens etc.). b. Work with local councils to identify a method to trigger welcome pack distribution (e.g. property registration, rates notice name change etc.). c. Distribute welcome pack at change of ownership.	
Lead Organisation	RCC
Support Organisation(s)	Local councils – LCC, BSC, BySC Government agencies: NSW Health, EPA, LLS, DPI, RMS, NPWS Industry bodies: AMS, NCMC, NSW Farmers Hazmat Response agencies: RFS, NSW Fire and Rescue Community groups and representatives including Landcare groups as relevant.
Total Cost Estimate (5 year)	$175,000 (allowance of $35,000/yr for engagement activities, community events, printing and distribution of welcome pack, etc.)
Total RCC Staff Time Estimate (5 year)	0.75 EFT (estimate of 0.15 EFT/yr for 5 years)
Potential Funding Sources	RCC, NSW Environmental Trust, Local councils – LCC, BSC, BySC
Timing	On-going (2020-2025)
Performance Targets	• Welcome pack complete and ready for distribution by Jan 2021

7.1.2 Strategy 2: Planning and Policy Review

Well-designed planning regulations are a critical component of sound catchment management and protection of water quality (NHMRC, NRMMC, 2011). Planning regulations should address management and control of high-risk land use in catchments and should also address the issue of long-term incremental development. Urban development, agriculture and general industry should be carefully scrutinised to ensure that they will not impact on water resources. On-site waste treatment and disposal systems should be permitted only where sites are suitable and there is minimal risk to the water supply. Such systems should be designed, installed and maintained correctly, and inspected regularly. Defects should be reported and rectified.

Where possible, protection of water resources should be included as a principal objective in planning policies. Responsibility for the development and implementation of planning strategies and regulations is generally shared between state and local government agencies. It is important that drinking water suppliers and environment and health authorities establish strong links with planning agencies and take an active role in the development or amendment of these planning strategies and regulations; and the evaluation of individual development proposals with respect to potential impacts on water quality or quantity.

Where appropriate, formal agreements should be required to ensure approval conditions are complied with and recorded on land titles to alert potential purchasers of the obligations associated with the property.

Action A2: OSSM System Planning and Policy Review

Desired Outcome	Effective regulation of OSSMS in drinking water catchments to minimise water quality impacts
Priority ranking	Medium
DESCRIPTION OF TASKS:	
1. Review and update the *Rous Water On-Site Wastewater Management Guidelines* (RCC, 2008) to provide guidance for managing OSSM systems located within a RCC drinking water catchment in line with current best practice and local council regulatory frameworks. 2. RCC to request councils to include considerations for OSSM systems in all DCPs as applicable to catchment areas.	
Lead Organisation	RCC
Support Organisation(s)	Local councils – LCC, BSC, BySC Government agencies: NSW Health, EPA
Total Cost Estimate (5 year)	$50,000 (allowance of $50,000 for external planning review)
Total RCC Staff Time Estimate (5 year)	0.2 EFT (estimate of 0.2 EFT in year 3)
Potential Funding Sources	RCC
Timing	Medium term (year 3 2022/23)
Performance Targets	• Review complete by June 2023

Action A3: Development Planning and Policy Review

Desired Outcome	Effective regulation of development in drinking water catchments to minimise water quality impacts. Local Councils systematically apply RCC requirements when assessing development applications occurring in drinking water catchments.
Priority ranking	Medium
DESCRIPTION OF TASKS:	
1. Review and update the *Development Control Plan for Development within the Rous Water Catchments* (RCC, 2009) in line with current best practice and local council regulatory frameworks. 2. Review of the overall development application/review process in partnership with local council including: a. Establish one set of requirements from RCC applicable to developments within RCC drinking water catchments. b. Determine requirements for referral of development applications to RCC when required. 3. Consult with LCC regarding implementation progress of the *Lismore Urban Stormwater Management Plan* (Hydrosphere Consulting, 2016) with regard to objectives for drinking water catchments.	
Lead Organisation	RCC
Support Organisation(s)	Local councils – LCC, BSC, BySC Government agencies: NSW Health, EPA
Total Cost Estimate (5 year)	$60,000 (allowance of $60,000 for external planning review)
Total RCC Staff Time Estimate (5 year)	0.2 EFT (estimate of 0.2 EFT in year 3)
Potential Funding Sources	RCC
Timing	Medium term (year 3 2022/23)
Performance Targets	• Reviews complete by June 2023

Plate 4: Left: Wilsons River Source tidal pool at Lismore, Top right: Browns Creek stormwater channel, Bottom right: Browns Creek channel during heavy rainfall

Source: Ecos (2009b); Hydrosphere Consulting (2016)

7.1.3 Strategy 3: Emergency Planning and Response

Action A4: Spills and Contamination Emergency Response and Notification Protocol

Desired Outcome	Continue to raise awareness of Hazmat response agencies about drinking water catchment locations and the heightened risk of contamination incidents occurring within catchments. Fast and effective clean-up of spills and contamination events to minimise drinking water risks. Timely notification to RCC to allow for adaptive management as part of operations to minimise risk to public health.
Priority ranking	High
DESCRIPTION OF TASKS:	
1. Formalise and gain agreement between responsible agencies on Hazmat response and clean up in drinking water catchment areas including: a. Hazmat incident notifications procedure between first responders, the EPA and RCC. Suitable time frames for notifications to be agreed to allow for timely management. b. Confirm training and education of first responder staff is adequate to determine whether an incident is located in a drinking water catchment and the necessary additional steps required to minimise drinking water risk.	
Lead Organisation	RCC
Support Organisation(s)	Hazmat response agencies: RFS, NSW Fire and Rescue Government agencies: EPA, NSW Health, NPWS, RMS Local councils – LCC, BSC, BySC
Total Cost Estimate (5 year)	n/a
Total RCC Staff Time Estimate (5 year)	0.025 EFT (estimate of 0.025 EFT in year 1)
Potential Funding Sources	n/a
Timing	Short term (year 1 2020/21)
Performance Targets	• Protocol agreed by June 2021

7.1.4 Strategy 4: Monitoring Evaluation and Reporting

There are a number of on-going monitoring and assessment actions across RCC catchments that are important to continue as part of the overall catchment management approach.

The RCC Catchment Water Quality Monitoring Program is an on-going part of the RCC DWMS to assess raw water quality risk and inform operational management of drinking water. Water quality data allows for detailed assessment of risk and should be on-going. Additional investigative monitoring and assessment actions have been identified within each catchment to measure the success of previous work, evaluate emerging risks and to provide information for evidence-based recommendations for on-going work. The on-going RCC Catchment Surveillance Inspections Program is an essential component of the RCC DWMS to identify any changes in catchments, or activity or conditions that present a risk to drinking water quality.

Action A5: RCC Catchment Water Quality Monitoring Program

Desired Outcome	Continue catchment water quality monitoring to assess risk, monitor changes, allow for operational adaptive management as needed and identify emerging issues
Priority ranking	Fundamental
DESCRIPTION OF TASKS:	
1. Continue the RCC Catchment Water Quality Monitoring Program in all drinking water catchments. The following modifications are recommended based on review of data: a. Modify 6-monthly pesticide screening at offtakes (currently the standard OC/OP screen) to include chemical compounds previously detected as part of intensive pesticide monitoring programs (i.e. Glyphosate, Triclopyr and Dicamba detected in 2003/04 intensive sampling program). 2. Conduct an annual review of catchment water quality data and document results in an annual report card. This will allow for timely assessment and review of trends and any areas of concern. 3. Conduct a comprehensive review of catchment water quality data every five years to examine trends in detail and review and update the monitoring program methodologies and outputs. 4. Communicate results of catchment water quality monitoring to the catchment working groups annually. 5. Publish annual report card on RCC webpage to inform the community of catchment water quality status and raise awareness of issues and areas for improvement.	
Lead Organisation	RCC
Support Organisation	NSW Health
Total Cost Estimate (5 year)	$50,000 in additional costs to the on-going program which is funded under RCC operational budget (allowance of $3,000 per year for additional pesticide monitoring at offtake sites, $5,000 for set up of annual report card, and $30,000 for comprehensive water quality review in year 2)
Total RCC Staff Time Estimate (5 year)	0.25 EFT (estimate of 0.05 EFT/yr for 5 years)
Potential Funding Sources	RCC, NSW Health
Timing	On-going (2020-2025)
Location	Water quality monitoring sites
Performance Targets	• Annual water quality report card published on RCC website by June 2021 • Comprehensive review report of catchment water quality data complete by June 2022

Action A6: RCC Catchment Surveillance Program

Desired Outcome	Regular inspections of the catchment areas in order to identify any activity or conditions that present a risk to catchment integrity and water quality.
Priority ranking	Fundamental
DESCRIPTION OF TASKS:	
1. Continue the RCC Catchment Surveillance Program in all drinking water catchments. 2. Review and update *RCC Catchment Surveillance Inspections Program* (RCC, 2011) including: a. Document incidents recorded since previous review including remedial actions and need for changes to program etc. b. Update responsibilities, agency names and duties in accordance with current information.	
Lead Organisation	RCC
Support Organisation	Local councils – LCC, BSC, BySC Government agencies: NPWS, NSW Health
Total Cost Estimate (5 year)	n/a
Total RCC Staff Time Estimate (5 year)	0.25 EFT (estimate of 0.05 EFT/yr for years 1-5)
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	All catchment areas
Performance Targets	• Review and update of 2011 *RCC Catchment Surveillance Inspections Program* by June 2021

Plate 5: Catchment imagery

Source: RCC (undated)

Action A7: Intensive Pesticide Sampling Program

Desired Outcome	Provide information to better assess the risk of pesticide use in catchments to public health.
Priority ranking	Medium
DESCRIPTION OF TASKS:	
1. Conduct intensive pesticide monitoring program in each catchment to better define risk and provide up to date information. The last intensive program was completed in 2009-2010 (over 10 years ago) and therefore an updated program is necessary to evaluate current risks considering changes in pesticide use and current monitoring techniques and technology. Refer to RCC Pesticide Risk Assessment 2020 for recommendations for monitoring including the use of emerging technology (passive samplers) to better assess risk. 2. Based on the results of the investigation provide recommendations for management as required.	
Lead Organisation	RCC
Support Organisation	NSW Health, research organisations
Total Cost Estimate (5 year)	$75,000 (allowance of $65,000 for passive sampling program assuming seasonal sampling – summer, autumn, winter, spring at RCD, ECD and WRS offtake sites and $10,000 for final report)
Total RCC Staff Time Estimate (5 year)	0.1 EFT (estimate of 0.1 EFT in year 2)
Potential Funding Sources	RCC, NSW Health
Timing	Short term (year 2 2021/22)
Location	RCD, ECD ,WRS offtakes
Performance Targets	• Intensive program final report completed by Oct 2023

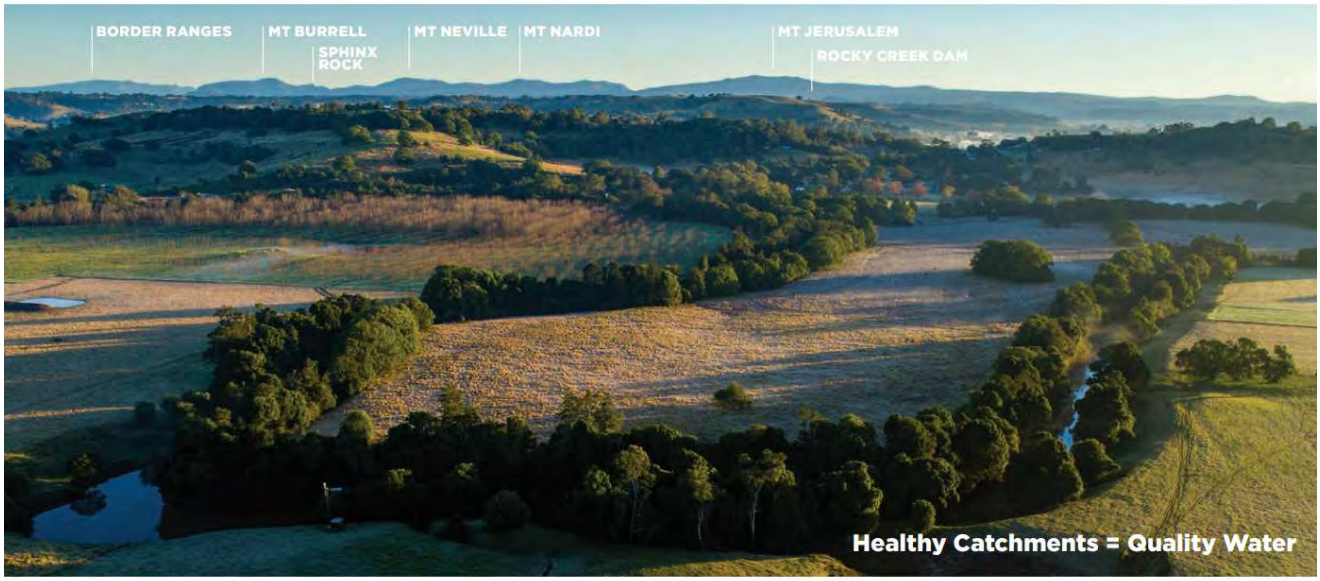

Plate 6: RCC Healthy Catchments postcard

Source: RCC (undated)

Action A8: Investigate Potentially Harmful Contaminants

Desired Outcome	Provide information to better assess the risk of catchment pollutants (e.g. pharmaceuticals, endocrine disrupting compounds (EDCs) and PFAS).
Priority ranking	Medium

DESCRIPTION OF TASKS:

1. Investigation to determine the presence and potential impacts of pharmaceuticals, EDCs and PFAS (Per- and poly-fluoroalkyl substances used in firefighting foams) in source water. The risk assessment for the WRS identified that there are known potential sources of these contaminants in the catchment (e.g. OSSM systems, municipal wastewater discharge and excretion of veterinary products by stock and fire fighting activities) however, to date there has not been any assessment of presence and levels in source water. This combined with an unknown treatment capacity at Nightcap WTP resulting in a medium residual risk being assigned to this hazard (refer Section 3.1). In order to better define the risk level, an investigative study is recommended to provide more information on potential human exposure from drinking water. This task involves:
   a. Design of sampling program. This initial investigation may be incorporated into the intensive pesticide monitoring program using passive samplers which can detect micro pollutants in source water including pharmaceuticals, EDCs and PFAS.
   b. Conduct sampling. The raw water offtakes in RCD, ECD and WRS are proposed as suitable locations for sampling source water in the first instance. Depending on results of this initial investigation, further sites may be proposed to better assess sources of contamination etc.
   c. Analyse results assess risk to human health. The Australian National Guidelines for Water Recycling (Phase 2) provide guideline concentrations for EDCs (and an approach for further developing guidelines) that are applicable to potable water supplies (NRMMC, EPHC and NHMRC 2008).
2. Based on the results of the investigation provide recommendations for management as required.

Lead Organisation	RCC
Support Organisation	NSW Health
Total Cost Estimate (5 year)	$12,000 (allowance of additional $12,000 for passive sample program assuming completed in conjunction with pesticide sampling)
Total RCC Staff Time Estimate (5 year)	0.1 EFT (estimate of 0.1 EFT in year 2)
Potential Funding Sources	RCC, NSW Health
Timing	Medium term (year 2 2021/22)
Location	Source water offtakes (RCD, ECD, WRS)
Performance Targets	• Final report completed by Oct 2023

Action A9: Performance Monitoring and Review of Actions

Desired Outcome	Review of CMP progress and monitoring of performance targets to ensure continuous improvement and that actions and approaches remain appropriate.
Priority ranking	Fundamental
DESCRIPTION OF TASKS:	
1. Annual reporting: Documentation of the effectiveness of the proposed actions will be reported as part of RCC's IP&R framework including progress towards the performance targets included in each action. 2. Five year review of the CMP will provide a basis for future catchment management planning. The review is required to consider: a. Results of IP&R Reporting. b. Status of CMP actions including overall success and any barriers to effective implementation. c. Data provided by water quality investigations. d. Any new or updated scientific knowledge, technology or catchment changes. e. Prevailing community attitudes, government policy and strategic planning status.	
Lead Organisation	RCC
Support Organisation	n/a
Total Cost Estimate (5 year)	n/a
Total RCC Staff Time Estimate (5 year)	Staff time allocated under existing budgets
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	All catchment areas
Performance Targets	• Annual IP&R reporting (years 1-5) • Five year review report completed by June 2025

Plate 7: Left: Rainforest regeneration 1 year after Lantana removal at Rocky Creek Dam; Right: Recovery after 30 years

Source: McDonald (2016)

7.2 Rocky Creek Dam Catchment Actions

There are a number of management actions currently in place to control known water quality risks in the RCD catchment. Action RC10: RCD On-going Catchment Controls RC10 lists the current controls that remain in force. Actions RC11-13 detail the additional tasks identified for implementation in the catchment over the next five years.

Action RC10: RCD On-going Catchment Controls

Desired Outcome	Continue current catchment controls to manage risks to drinking water quality.
Priority ranking	Fundamental
DESCRIPTION OF TASKS:	
1. Maintain drinking water catchment signage. The signage includes: (a) general prohibition signage; (b) restricted area advisory signage; (c) educational signage regarding the sensitivity of the local environment; and (d) no swimming prohibition signage. 2. Continue catchment surveillance and informational and regulatory signage to minimise recreational use of waterways in the RCD catchment. Refer Action A6: RCC Catchment Surveillance Program. 3. Liaise with NPWS to maintain current controls and consider drinking water risks in decision-making (i.e. bushfire detection and response, land stabilisation works, recreational trail maintenance, management trails maintenance, catchment surveillance). Also refer Action RC13: On-going Collaboration with NPWS. 4. Hazmat spill response (refer Action A4: Spills and Contamination Emergency Response and Notification Protocol). 5. On-going fire detection and response. 6. Chemical certification required for all RCC/NPWS staff and contractors undertaking chemical application in the catchment (e.g. for weed control etc.). 7. Reservoir management undertaken by RCC is in accordance with DWMS (i.e. aeration/destratification, algal alerts, depths of abstraction, customer complaints process, removal or algae from wastewater etc.) 8. Continue to implement formal procedure for the receipt of chemicals at Nightcap WTP that includes risk management controls for every stage of the chemical delivery process, thereby minimising the risk of spills to stormwater. 9. Upgrade of chemical storage and delivery facilities to prevent drainage of internal process areas to stormwater (currently underway in 2020). Monitor performance of new facilities. 10. Regular inspections and servicing/maintenance of Nightcap WTP OSSM system to ensure optimal performance. 11. Adherence to relevant legislation and related regulations and guidelines controlling pollution of the environment and development planning (i.e. *Protection of Environment Operations Act 1997*; *Environmental Planning and Assessment Act 1979; Local Government Act 1993; Contaminated Land Management Act 1997; Pesticides Act 1999; Biodiversity Conservation Act 2016; Soil Conservation Act 1938, National Parks and Wildlife Act 1974).*	
Lead Organisation	RCC
Support Organisation	NPWS
Total Cost Estimate (5 year)	No additional costs
Total RCC Staff Time Estimate (5 year)	0.25 EFT (estimate of 0.05 EFT/yr for 5 years)
Potential Funding Sources	RCC, NPWS
Timing	On-going (2020-2025)
Location	RCD catchment
Performance Targets	• Refer Action A9: Performance Monitoring and Review of Actions

7.2.1 Strategy 4: Monitoring Evaluation and Reporting

Action RC11: Post-Bushfire Review of Water Quality and Catchment Condition

Desired Outcome	Consider results of post-bushfire catchment and water quality condition assessment to understand impacts of bushfire on water quality and recommend adaptive management as required.
Priority ranking	Medium
DESCRIPTION OF TASKS:	
RCC and NSW Health are currently undertaking a post-bushfire review of water quality and catchment condition in NSW following the unprecedented 2019 bushfire season. RCD catchment is included in this assessment. The following tasks are outlined: 1. Review NSW Health reporting when available including water quality conclusions (i.e. contaminants, turbidity, Chromium 6 etc.), key risk factors and implications for drinking water catchment management, treatment and supply. 2. Based on the information compiled as part of no.1, build an understanding of the potential consequences of bushfire impacts on source water quality and implications for water treatment processes at Nightcap WTP. 3. Collaborate with NPWS in the review of the *Nightcap National Park, Whian Whian State Conservation Area and Snows Gully Nature Reserve Fire Management Strategy* (NPWS, 2005) incorporating considerations from the post-bushfire review. Based on preliminary review the following updates are required to the fire management strategy: a. Acknowledge and include RCC infrastructure (i.e. RCD and WTP) as a critical public asset in the catchment with potential to be negatively impacted by bushfire. b. Include RCC as a contact in the plan.	
Lead Organisation	RCC
Support Organisation	Government agencies: NPWS, NSW Health RFS, NSW Fire and Rescue
Total Cost Estimate (5 year)	$10,000 (allowance of $5,000 for Year 1 and 2 to cover any additional water quality testing that may be required)
Total RCC Staff Time Estimate (5 year)	n/a
Potential Funding Sources	RCC
Timing	Short term (year 1 2020/21)
Location	RCD catchment
Performance Targets	• Review complete by June 2021 • Review of NPWS Fire Management Strategy by June 2021

7.2.2 Strategy 5: On-ground Catchment Management Works

Action RC12: RCD Buffer Zone Maintenance

Desired Outcome	Continue to maintain and improve the condition of riparian buffer zones in RCC estate in the vicinity of RCD for continued buffering and protection of drinking water sources.
Priority ranking	High
DESCRIPTION OF TASKS:	
Complete regular maintenance, weed control and enhancement of riparian buffer zones.	
Lead Organisation	RCC
Support Organisation	-
Total Cost Estimate (5year)	n/a
Total RCC Staff Time Estimate (5 year)	Staff time for RCC bush regeneration teams funded under RCC operational budget
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	RCC owned estate in the vicinity of RCD
Performance Targets	• Maintain condition of buffer zone in RCD catchment

7.2.3 Strategy 1: Engagement, Education and Awareness

Action RC13: On-going Collaboration with NPWS

Desired Outcome	Continue close collaboration with NPWS to ensure on-going effective management for protection of drinking water sources.
Priority ranking	High
DESCRIPTION OF TASKS:	
1. Regular communications with NPWS to effectively manage drinking water catchment areas including consideration of all drinking water risks in decision-making. 2. Renew/update MOU between NPWS and RCC for management and maintenance of land. 3. Communicate risk assessment outcomes and this CMP with NPWS, with reference to controls under the jurisdiction of NPWS. This CMP assumes NPWS controls remain in force. 4. Collaborate with NPWS in the review of the Fire Management Strategy (NPWS, 2005) as discussed in Action RC11: Post-Bushfire Review of Water Quality and Catchment Condition.	
Lead Organisation	RCC
Support Organisation	NPWS
Total Cost Estimate (5year)	n/a
Total RCC Staff Time Estimate (5 year)	Staff time allocated under existing budgets
Potential Funding Sources	n/a
Timing	On-going (2020-2025)
Performance Targets	• MOU updated by June 2021

7.3 Wilsons River Source Catchment Actions

There are a number of management actions currently in place to control known water quality risks in the WRS catchment. Action WR14: WRS On-going Catchment Controls lists the current controls that remain in force. Actions WR15-17 detail the additional tasks identified for implementation in the catchment over the next five years.

Action WR14: WRS On-going Catchment Controls

Desired Outcome	Continue current catchment controls to manage risks to drinking water quality.
Priority ranking	Fundamental
DESCRIPTION OF TASKS:	
1. Maintain drinking water catchment signage. The signage includes: (a) drinking water catchment advisory signage with contact number to call in case of contamination incident; (c) educational signage regarding the sensitivity of the local environment. 2. Continue catchment surveillance (refer Action A6: RCC Catchment Surveillance Program). 3. Hazmat spill response including capture, bund, and removal of contaminants by first responders (e.g. RFS, NSW Fire and Rescue). RCC notification of incident by EPA to allow adaptive management and verification testing as necessary. Refer Action A4: Spills and Contamination Emergency Response and Notification Protocol. 4. On-going fire detection and response. 5. Chemical certification required for all RCC staff and contractors undertaking chemical application in the catchment (e.g. for weed control etc.). 6. Implementation of development controls in recognition of the RCC Drinking Water Catchment Overlay providing additional protection for drinking water when local council assesses new developments. 7. RCC to liaise with LCC, BSC and BySC regarding progress and implementation of relevant management plans, strategies and works (i.e. OSSM strategies; stormwater management and improvement; LCC sewer replacement/renewal program; relevant DCPs etc.). 8. RCC to liaise with EPA regarding on-going licensing and regulation of licensed discharges and contaminated land. 9. Adherence to relevant legislation and related regulations and guidelines controlling pollution of the environment and development planning (i.e. *Protection of Environment Operations Act 1997*; *Environmental Planning and Assessment Act 1979; Local Government Act 1993; Contaminated Land Management Act 1997; Pesticides Act 1999; Biodiversity Conservation Act 2016; Soil Conservation Act 1938, National Parks and Wildlife Act 1974).*	
Lead Organisation	RCC
Support Organisation	All catchment stakeholders
Total Cost Estimate (5 year)	No additional costs
Total RCC Staff Time Estimate (5 year)	0.25 EFT (estimate of 0.05 EFT/yr for 5 years)
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	WRS catchment
Performance Targets	• Refer Action A9: Performance Monitoring and Review of Actions

7.3.1 Strategy 4: Monitoring Evaluation and Reporting

Action WR15: WRS River Reach Plan Audit and Planning

Desired Outcome	Assess progress/current condition of existing River Reach Plan areas Audit new areas and prepare property-scale plans for extension of the River Reach Plan works
Priority ranking	High
DESCRIPTION OF TASKS:	
1. Audit the existing River Reach Plan sites to assess progress/current condition and recommend additional work as required. The assessment will essentially repeat the original assessments completed in 2011 as part of the River Reach Plan development (refer NRCMA, 2011) including: a. Update maps of work completed (this has been undertaken by RCC for most areas and will require minimal additional work to update to current status). b. Site inspections to assess condition documenting: width of vegetation; types and density of weeds in the canopy, mid-storey and groundcover; native regeneration; stock access; and bank erosion. c. Drone flyover of sites to document aerial view and allow for repeated drone flights to visually document progress. d. Determine level of achievement for the expected target condition documented in Northern Rivers Catchment Management Authority- NRCMA (2011) and provide comment on any barriers to success. e. Based on the above outcomes provide recommendations for further management as required. 2. Audit new sites and prepare property-scale site action plans for extension of the River Reach Plan works upstream of the current sites. The audit methodology will essentially repeat the original assessments completed in 2011 as part of the River Reach Plan development (refer NRCMA, 2011). Based on the outcomes of the catchment risk assessment (Appendix 2) the following areas are highlighted for future work: a. Target grazing land and promote the exclusion of stock from accessing waterways (e.g. watercourse fencing, off-stream watering points, improved stock crossings etc.). b. Improve bank stability. c. Focus on improving overall habitat condition and maximising land buffering capacity in riparian areas including complete vegetation strata (e.g. groundcovers, mid-strata as well as canopy).	
Lead Organisation	RCC
Support Organisation	Landholders
Total Cost Estimate (5 year)	$50,000 (staff time and allowance of $50,000 for external audit including field inspections and reporting in year 1)
Total RCC Staff Time Estimate (5 year)	0.4 EFT (estimate of 0.4 EFT in year 1)
Potential Funding Sources	RCC
Timing	Short term (year 1 2020/21)
Location	River Reach Plan area and upstream extension along Wilsons River
Performance Targets	• River Reach Plan Audit completed by June 2021

7.3.2 Strategy 5: On-ground Catchment Management Works

Action WR16: River Reach Plan Extension

Desired Outcome	Continue to improve the condition of riparian buffer zones and adjacent lands for greater buffering and protection of drinking water sources.
Priority ranking	High
DESCRIPTION OF TASKS:	
Based on results of Action WR15: WRS River Reach Plan Audit and Planning, continue, modify and/or extend implementation of River Reach Plans through engagement activities with landholders and on-ground works. Tasks are expected to include: 1. Establish landholder agreements. 2. Exclusion of stock from accessing waterways (e.g. watercourse fencing, off-stream watering points, stock crossings etc.). 3. River bank protection works to improve stability and reduce bank erosion. 4. Addressing localised erosion and sedimentation issues through strategic buffer plantings, stock control and support of local erosion control plans. 5. Wherever possible increase the width of the riparian corridor to improve vegetation structure and slow runoff and sedimentation. 6. Create adequate buffers between source waterways and agricultural areas to minimise adverse impacts from agricultural runoff, stock access, farm vehicles, other machinery and spray drift. 7. Connect existing native vegetation through assisted natural regeneration and supplementary plantings in cleared or degraded areas. 8. Utilising the native seed bank to reduce planting costs and enhance use of local provenance species 9. Establishing complete vegetation strata (e.g. groundcovers, mid-strata as well as canopy) to maximise land buffering capacity and improve resilience to future weed invasion through lower light levels. 10. A targeted, systematic approach to managing invasive weeds. 11. Building capacity of landholders to maintain riparian areas from key threats (e.g. invasive weeds, stock access etc.).	
Lead Organisation	RCC
Support Organisation	Landholders, Local Landcare Groups, North Coast Meat Cooperative (NCMC)
Total Cost Estimate (5 year)	$300,000 (allowance of $75,000 per year from Year 2-5 which equates to River Reach Plan works for an additional 5km over the CMP period including both banks to 25m width).
Total RCC Staff Time Estimate (5 year)	0.6 EFT (estimate of 0.15 EFT in years 2-5)
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	Existing River Reach Plan target area Lismore to Boatharbour
Performance Targets	• 5km of River Reach Work completed by June 2025 at priority sites

Action WR17: WRS Buffer Zone Maintenance

Desired Outcome	Continue to maintain and improve the condition of riparian buffer zones in RCC estate in the vicinity of the WRS offtake at Howards Grass for greater buffering and protection of drinking water sources.
Priority ranking	High
DESCRIPTION OF TASKS:	
Complete regular maintenance, weed control and enhancement of riparian buffer zones.	
Lead Organisation	RCC
Support Organisation	-
Total Cost Estimate (5 year)	n/a
Total RCC Staff Time Estimate (5 year)	Staff time for RCC bush regeneration teams funded as operational expense
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	RCC owned estate in the vicinity of the WRS Offtake at Howards Grass
Performance Targets	• Maintain condition of buffer zone

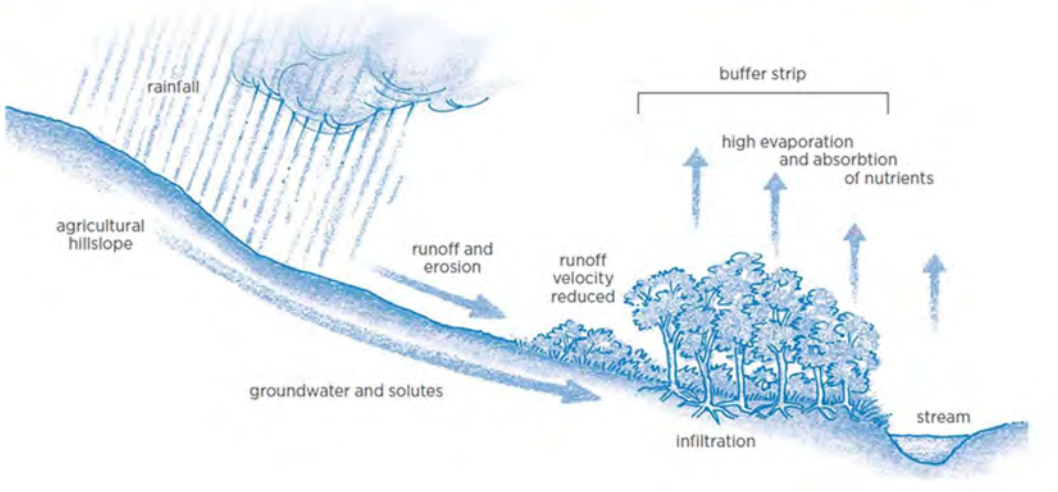

Plate 8: The Wilsons River Reach Plan works adjacent to WRS offtake Top Left: May 2015; Top Right: June 2018; and Below: how a riparian buffer strip functions to protect the stream from contaminants

Source: S.Hood (photos) and RCC (2017)

7.4 Emigrant Creek Dam Catchment Actions

There are a number of management actions currently in place to control known water quality risks in the ECD catchment. Action EC18 lists the current controls that remain in force. Actions EC 19-24 detail the additional tasks identified for implementation in the catchment over the next five years.

Action EC18: ECD On-going Catchment Controls

Desired Outcome	Continue current catchment controls to manage risks to drinking water quality.
Priority ranking	Fundamental
DESCRIPTION OF TASKS:	
1. Maintain drinking water catchment signage. The signage includes: (a) drinking water catchment advisory signage with contact number to call in case of contamination incident; (c) educational signage regarding the sensitivity of the local environment. 2. Continue catchment surveillance (refer Action A6: RCC Catchment Surveillance Program). 3. Hazmat spill response including capture, bund, and removal of contaminants by first responders (e.g. RFS, NSW Fire and Rescue). RCC notification of incident by EPA to allow adaptive management and verification testing as necessary. Refer Action A4: Spills and Contamination Emergency Response and Notification Protocol. 4. On-going fire detection and response. 5. Chemical certification required for all RCC staff and contractors undertaking chemical application in the catchment (e.g. for weed control etc.). 6. Reservoir management undertaken by RCC is in accordance with DWMS (i.e. aeration/destratification, algal alerts, depths of abstraction, customer complaints process, removal or algae from wastewater etc.) 7. Continue to implement formal procedure for the receipt of chemicals at ECD WTP that includes risk management controls for every stage of the chemical delivery process, thereby minimising the risk of spills to stormwater. 8. Implementation of development controls in recognition of the RCC Drinking Water Catchment Overlay providing additional protection for drinking water when local council assesses new developments. 9. RCC to liaise with BSC regarding progress and implementation of relevant management plans, strategies and works (i.e. OSSM strategy implementation etc.). 10. Adherence to relevant legislation and related regulations and guidelines controlling pollution of the environment and development planning (i.e. *Protection of Environment Operations Act 1997*; *Environmental Planning and Assessment Act 1979; Local Government Act 1993; Contaminated Land Management Act 1997; Pesticides Act 1999; Biodiversity Conservation Act 2016; Soil Conservation Act 1938, National Parks and Wildlife Act 1974).*	
Lead Organisation	RCC
Support Organisation	All catchment stakeholders
Total Cost Estimate (5 year)	No additional costs
Total RCC Staff Time Estimate (5 year)	0.25 EFT (estimate of 0.05 EFT/yr for 5 years)
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	ECD catchment
Performance Targets	• Refer Action A9: Performance Monitoring and Review of Actions

7.4.1 Strategy 4: Monitoring Evaluation and Reporting

Action EC19: ECD River Reach Plan Audit and Planning

Desired Outcome	Assess progress/current condition of existing River Reach Plan areas Audit new areas and prepare property-scale plans for extension of the River Reach Plan works
Priority ranking	High

DESCRIPTION OF TASKS:

1. Audit the existing River Reach Plan sites to assess progress/current condition and recommend additional work as required. The assessment will essentially repeat the original assessments completed in 2017 as part of the River Reach Plan development (refer RCC, 2017) including:
   a. Update maps of work completed (this has been undertaken by RCC for most areas and will require minimal additional work to update to current status).
   b. Site inspections to assess condition documenting: width of vegetation; types and density of weeds in the canopy, mid-storey and groundcover; native regeneration; stock access; and bank erosion.
   c. Drone flyover of sites to document aerial view and allow for repeated drone flights to visually document progress.
   d. Determine level of achievement for the expected target condition documented in Northern Rivers Catchment Management Authority- NRCMA (2011) and provide comment on any barriers to success.
   e. Based on the above outcomes provide recommendations for further management as required.
2. Audit new sites and prepare property-scale plans for extension of the River Reach Plan works upstream of the current sites. The audit methodology will essentially repeat the original assessments completed in 2017 as part of the River Reach Plan development (refer RCC, 2017). Based on the outcomes of the catchment risk assessment (Appendix 2) the following areas are highlighted for future work:
   a. Target grazing land and promote the exclusion of stock from accessing waterways (e.g. watercourse fencing, off-stream watering points, improved stock crossings etc.).
   b. Improve bank stability.
3. Focus on improving overall habitat condition and maximising land buffering capacity in riparian areas including complete vegetation strata (e.g. groundcovers, mid-strata as well as canopy).

Lead Organisation	RCC
Support Organisation	Landholders
Total Cost Estimate (5 year)	$50,000 (staff time and allowance of $50,000 for external audit including field inspections and reporting in year 1)
Total RCC Staff Time Estimate (5 year)	0.4 EFT (estimate of 0.4 EFT in year 1)
Potential Funding Sources	RCC
Timing	Short term (2020/21)
Location	River Reach Plan area and upstream extension along Wilsons River
Performance Targets	• River Reach Plan Audit completed by June 2021

7.4.2 Strategy 5: On-ground Catchment Management Works

Action EC20: River Reach Plan Extension

Desired Outcome	Continue to improve the condition of riparian buffer zones and adjacent lands for greater buffering and protection of drinking water sources.
Priority ranking	High

DESCRIPTION OF TASKS:

Based on results of Action EC19: ECD River Reach Plan Audit and Planning, continue, modify and/or extend implementation of River Reach Plans through engagement activities and on-ground works as suitable. Tasks are expected to include:

1. Establish landholder agreements.
2. Exclusion of stock from accessing waterways (e.g. watercourse fencing, off-stream watering points, stock crossings etc.).
3. River bank protection works to improve stability and reduce bank erosion.
4. Addressing localised erosion and sedimentation issues through strategic buffer plantings, stock control and support of local erosion control plans.
5. Wherever possible increase the width of the riparian corridor to improve vegetation structure and slow runoff and sedimentation.
6. Create adequate buffers between source waterways and agricultural areas to minimise adverse impacts from agricultural runoff, stock access, farm vehicles, other machinery and spray drift.
7. Connect existing native vegetation through assisted natural regeneration and supplementary plantings in cleared or degraded areas.
8. Utilising the native seed bank to reduce planting costs and enhance use of local provenance species
9. Establishing complete vegetation strata (e.g. groundcovers, mid-strata as well as canopy) to maximise land buffering capacity and improve resilience to future weed invasion through lower light levels.
10. A targeted, systematic approach to managing invasive weeds.
11. Building capacity of landholders to maintain riparian areas from key threats (e.g. invasive weeds, stock access etc.).

Lead Organisation	RCC
Support Organisation	Landholders
Total Cost Estimate (5 year)	$240,000 (allowance of $60,000 per year from Year 2-5 which equates to River Reach Plan works for an additional 4km (both banks to 25m width) over the CMP period). This will complete the main channel reach upstream of the Pacific Highway to the top of catchment.
Total RCC Staff Time Estimate (5 year)	0.6 EFT (estimate of 0.15 EFT in years 2-5)
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	River Reach Plan area ECD to Pacific Highway and extending upstream of Highway
Performance Targets	• 4km of River Reach Work completed by June 2025.

Action EC21: ECD Buffer Zone Maintenance

Desired Outcome	Continue to maintain and improve the condition of riparian buffer zones in RCC estate in the vicinity of ECD for greater buffering and protection of drinking water sources.
Priority ranking	High
DESCRIPTION OF TASKS:	
Complete regular maintenance, weed control and enhancement of riparian buffer zones.	
Lead Organisation	RCC
Support Organisation	-
Total Cost Estimate (5 year)	n/a
Total RCC Staff Time Estimate (5 year)	Staff time for RCC bush regeneration teams funded under RCC operational budget
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	RCC owned estate in the vicinity of ECD
Performance Targets	• Maintain condition of buffer zone in ECD catchment

Plate 9: Emigrant Creek Dam Catchment Reach Plan works Left: Oct 2017; Right: Jan 2019

Source: S.Hood

Action EC22: Trial Farm-Based Erosion Management Plans

Desired Outcome	Establish a trial site for a farm-based erosion management plan in collaboration with the AMS to address sediment export from macadamia orchards.
Priority ranking	High
DESCRIPTION OF TASKS:	
1. Revisit previous partnership between RCC and the AMS to attract funding for macadamia orchard erosion. The previous program aimed to produce farm-based erosion management plans to address sediment export. The following tasks are required: a. Engage with AMS to discuss the proposed work and potential for implementation, funding opportunities and sites etc. b. RCC to make a monetary co-contribution for the project with anticipated benefit for source water protection. c. Select an initial trial site to allow for a small-scale on-ground assessment of the impact of such works on water source protection. d. Develop farm-based erosion management plan e. Implement works. f. Monitor site. g. Report results. 2. Based on results, assess the effectiveness of works and recommend next steps.	
Lead Organisation	RCC
Support Organisation	Landholders , AMS
Total Cost Estimate (5 year)	$50,000 (allowance of $50,000 for RCC co-contribution assuming successful grant application and funding secured from Hort Innovation funding)
Total RCC Staff Time Estimate (5 year)	0.15 EFT (estimate of 0.15 EFT in year 3)
Potential Funding Sources	RCC, Hort Innovation funding, AMS
Timing	Medium term (year 3 2022/23)
Location	ECD Catchment
Performance Targets	• On-ground works completed by June 2023.

7.4.3 Strategy 1: Engagement, Education and Awareness

Action EC23: Pesticide Notification

Desired Outcome	Landholders implement the Australian Macadamia Society (AMS) best-practice guidelines regarding pesticide notifications.
Priority ranking	High
DESCRIPTION OF TASKS:	
1. RCC to work together with the Australian Macadamia Society (AMS) to encourage application of best-practice guidelines regarding pesticide notifications. The *Best Practice Guidelines for Application of Chemicals in Macadamia Orchards* (AMS, 2011) provides guidelines to notify neighbours of planned pesticide use using an appropriate method that makes sense for all (refer section 1.3 of the guidelines).	
Lead Organisation	RCC
Support Organisation(s)	AMS, Catchment Landholders and Fam Managers
Total Cost Estimate (5 year)	n/a
Total RCC Staff Time Estimate (5 year)	0.025 EFT (estimate of 0.025 EFT in year 1)
Potential Funding Sources	n/a
Timing	On-going (2020-2025)
Performance Targets	• Collaboration with AMS commenced by June 2021

7.5 Proposed Dunoon Dam Catchment Management Actions

7.5.1 Strategy 5: On-ground Catchment Management Works

Action DD24: DD Buffer Zone Maintenance

Desired Outcome	Continue to maintain and improve the condition of riparian buffer zones in RCC estate in the vicinity of the potential DD.
Priority ranking	High
DESCRIPTION OF TASKS:	
1. Complete regular maintenance, weed control and enhancement on RCC land. 2. For areas under agistment, ensure that agistment agreements include requirements for appropriate management of stock and land to prevent erosion and land degradation and management of priority weeds as required under the Biosecurity *Act 2015.*	
Lead Organisation	RCC
Support Organisation	-
Total Cost Estimate (5 year)	n/a
Total RCC Staff Time Estimate (5 year)	Staff time for RCC bush regeneration teams funded under RCC operational budget
Potential Funding Sources	RCC
Timing	On-going (2020-2025)
Location	RCC owned estate in DD catchment
Performance Targets	• Maintain condition of buffer zone in DD catchment

Plate 10: Left: RCC planting works Right: Wilsons River near Federal

Source: www.rous.nsw.gov.au

8. BUSINESS PLAN

The business plan outlines the key components of the CMP, including the timing and cost of the proposed actions.

The business plan specifies:

- Action ID number and name.
- Priority ranking.
- Cost estimate.
- Timing.

Table 9: Catchment Management Business Plan

Strategy/Action/Year	Priority Ranking	Total 5 year cost	DP1	DP2			
			Year 1	Year 2	Year 3	Year 4	Year 5
		$'000	2020/21	2021/22	2022/23	2023/24	2024/25
Engagement, Education and Awareness							
Action A1: Catchment Landholder Education and Awareness	High	175	35	35	35	35	35
Planning and Policy Review							
Action A2: OSSM System Planning and Policy Review	Medium	50			50		
Action A3: Development Planning and Policy Review	Medium	60			60		
Emergency Planning and Response							
Action A4: Spills and Contamination Emergency Response and Notification Protocol	High	0	no additional cost				
Monitoring Evaluation and Reporting							
Action A5: RCC Catchment Water Quality Monitoring Program	Fundamental	50	8	33	3	3	3
Action A6: RCC Catchment Surveillance Program	Fundamental	0	no additional cost				
Action A7: Intensive Pesticide Sampling Program	High	75		75			
Action A8: Investigate Potentially Harmful Contaminants	Medium	24		12	12		
Action A9: Performance Monitoring and Review of Actions	Fundamental	0	no additional cost				
Rocky Creek Dam Catchment Actions							
Action RC10: RCD On-going Catchment Controls	Fundamental	0	no additional cost				
Action RC11: Post-Bushfire Review of Water Quality and Catchment Condition	Medium	10	5	5			
Action RC12: RCD Buffer Zone Maintenance	High	0	no additional cost				
Action RC13: On-going Collaboration with NPWS	Fundamental	0	no additional cost				

Strategy/Action/Year	Priority Ranking	Total 5 year cost	DP1	DP2			
			Year 1	Year 2	Year 3	Year 4	Year 5
		$'000	2020/21	2021/22	2022/23	2023/24	2024/25
Wilsons River Source Catchment Actions							
Action WR14: WRS On-going Catchment Controls	Fundamental	0	no additional cost				
Action WR15: WRS River Reach Plan Audit and Planning	Fundamental	50	50				
Action WR16: River Reach Plan Extension	High	300		75	75	75	75
Action WR17: WRS Buffer Zone Maintenance	Medium	0	no additional cost				
Emigrant Creek Dam Catchment Actions							
Action EC18: ECD On-going Catchment Controls	Fundamental	0	no additional cost				
Action EC19: ECD River Reach Plan Audit and Planning	Fundamental	50	50				
Action EC20: River Reach Plan Extension	High	240		60	60	60	60
Action EC21: ECD Buffer Zone Maintenance	Medium	0	no additional cost				
Action EC22: Trial Farm-Based Erosion Management Plans	High	50			50		
Action EC23: Pesticide Notification	High	0	no additional cost				
Potential Dunoon Dam Catchment Actions							
Action DD24: DD Buffer Zone Maintenance	Low	0	no additional cost				
TOTALS		**1134**	**148**	**295**	**345**	**173**	**173**

Notes: Years correspond to financial year i.e. 2020/21 is Year 1 (start 1st July 2020, end 30th June 2021) etc.

9. REFERENCES

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GLOSSARY AND ABBREVIATIONS

ADWG	Australian Drinking Water Guidelines
AMS	Australian Macadamia Society
ANZECC	Australian and New Zealand Environment and Conservation Council- provided governments and communities with a set of tools for assessing and managing ambient water quality and sediment quality in natural and semi-natural water resources.
Aquatic	Living or growing in water, not on land.
BOM	Bureau of Meteorology
BSC	Ballina Shire Council
BySC	Byron Shire Council
CMP	Catchment Management Plan
CZMP	Coastal Zone Management Plan
DD	Dunoon Dam
Dissolved Oxygen	Oxygen dissolved in the water (oxygen saturation). Often abbreviated to DO
DP	Council's four year Delivery Program
DPI Fisheries	Department of Planning, Industry and Environment Regions, Industry, Agriculture and Resources Department of Primary Industries Fisheries
DPIE	NSW Department of Planning Industry and Environment
DPIE – Crown Lands	Department of Planning, Industry and Environment, Crown Lands (formerly DI Lands)
DWMS	Drinking Water Management System
ECD	Emigrant Creek Dam
EDC	Endocrine Disrupting Chemical – substances in the environment (air, soil, or water supply), food sources, personal care products, and manufactured products that interfere with the normal function of your body's endocrine system.
Ecology	The interactions between organisms and their environment
Ecosystem	Refers to all the biological and physical parts of a biological unit (e.g. an estuary, forest, or planet) and their interconnections.
EES – Coast and Estuaries	Department of Planning, Industry and Environment – Environment, Energy and Science – Coast and Estuaries, formerly known as OEH Coasts and Estuaries
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environmental Protection Agency
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
Hazmat	A material (such as flammable or poisonous material) that would be a danger to life or to the environment if released without precautions
Hydrology	The study of water and its properties, including precipitation onto land and returning to oceans

IP&R	NSW Integrated Planning and Reporting Framework
LCC	Lismore City Council
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Services
MEMA	Marine Estate Management Authority
MOU	Memorandum of Understanding
NCMC	North Coast Meat Cooperative
NHMRC	National Health and Medical Research Council
NPWS	National Parks and Wildlife Service
NRMMC	Natural Resource Management Ministerial Council
OEH	Office of Environment and Heritage (now EES- Coasts and Estuaries)
RCC	Rous County Council
RCD	Rocky Creek Dam
RFS	Rural Fire Service
Riparian	Of, on or relating to the banks of a watercourse
RMS	Roads and Maritime Services
Terrestrial	Living or growing on land (not aquatic)
Turbid	Cloudy or dirty (not clear)
Turbidity	A measure of the amount of light-attenuating particles in a water body.
WRS	Wilsons River Source
WTP	Water Treatment Plant

Appendix 1. STATUS OF EXISTING RCC CATCHMENT MANAGEMENT PLAN (CMP) ACTIONS

Appendix 2. RCC DRINKING WATER CATCHMENTS RISK ASSESSMENT 2020

Appendix 3. PROJECTS THAT ARE NOT FUNDED IN THE CMP

Table 10: Business Plan for unfunded projects

Strategy/Action/Year	Priority Ranking	Total 5 year cost	DP1	DP2			
			Year 1	Year 2	Year 3	Year 4	Year 5
		$'000	2020/21	2021/ 22	2022/ 23	2023/ 24	2024/ 25
Engagement, Education and Awareness							
Action U25: Community Carp Muster	Low	20				10	10

Plate 11: Lismore River Festival and Carp Muster flyer 2017

Source: https://conservationvolunteers.com.au/news/2017/11/lismore-river-festival-carp-muster/

Action U25: Community Carp Muster

Desired Outcome	Establish an annual community Carp Muster event to promote awareness about the pest species and decrease numbers in drinking water catchments.
Priority ranking	Low
DESCRIPTION OF TASKS:	
1. Determine details of the Carp Muster including: a. Locations (e.g. Wilsons River tidal pool, ECD) b. Timing (Spring may present low flow periods and fine weather suitable for the event) c. Rules and regulations including: i. Registration, ii. Fishing licence requirements, iii. Equipment (e.g. rods, reel and handlines in accordance with NSW rules and regulations), iv. By-catch best practice (catch and release), v. Weigh-in rules. d. Prizes and categories (e.g. cash/vouchers or products) in age groups etc. e. Investigate any potential safety and/or liability issues. 2. Consultation with DPI Fisheries regarding the event and any special requirements. 3. Develop promotional material and advertising. 4. Run pilot program (trial). 5. Assess success of the pilot and determine repeat events as appropriate.	
Lead Organisation	RCC
Support Organisation(s)	DPI-Fisheries LCC OzFish Relevant businesses (e.g. Ballina Fishermans Co-op, angling outlets etc.) General public
Total Cost Estimate (5 year)	$40,000 (staff / stakeholder time and allowance of $10,000 per year for implementation (e.g. media, prizes and event costs)
Potential Funding Sources	RCC, DPI-Fisheries
Timing	Year 2 - 5
Performance Targets	• Carp Muster pilot held by Dec 2022

Hydrosphere Consulting

Rous County Council

Draft RCC Catchment Management Plan Public Exhibition - Submissions Report

Final Report

Disclaimer:

This report has been prepared on behalf of and for the exclusive use of Rous County Council, and is subject to and issued in accordance with the agreement between Rous County Council and Hydrosphere Consulting. Hydrosphere Consulting accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

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JOB 19-047 RCC DRAFT CMP – SUBMISSIONS REPORT

REV	DESCRIPTION	AUTHORS	REVIEW	APPROVAL	DATE
0	Draft for Client Review	K.Pratt	R. Campbell	R.Campbell	20/05/20
1	Final Report updated with minor changes	K.Pratt	-	K.Pratt	20/05/20

CONTENTS

TABLES

1. INTRODUCTION

Hydrosphere Consulting has prepared a draft RCC Catchment Management Plan (CMP) (Hydrosphere Consulting, 2020) on behalf of Rous County Council (RCC).

Three formal submissions were received during the public exhibition phase. One additional submission was received 1 week after the closure of the public exhibition period and has been added to this report. Further details of the exhibition process and the submissions received are provided in the following sections.

2. EXHIBITION PROCESS

The draft CMP (Hydrosphere Consulting, 2020) was placed on public exhibition between 24 April 2020 and 13th May 2020. Public promotion of the exhibited plan included:

- Information on Council's 'Documents on exhibition page' including links to download the CMP and supporting information.
- Email notification to stakeholders who had previously been involved with the project including the Catchment Risk Assessment Working Group and attendees of the Catchment Risk Assessment Workshops.

3. RCC COUNCILLOR WORKSHOP

A RCC councillor workshop was held prior to the public exhibition phase on 18th March 2020. Hydrosphere Consulting staff presented the draft CMP and provided further opportunity for councillors to provide comments or ask questions.

4. SUBMISSIONS RECEIVED

A total of four (4) submissions were received during and following public exhibition of the draft CMP. Submissions were provided by individual members of the community, community groups and government agencies. A summary of submission types is provided as Table 1. The submissions received are summarised in Table 2 together with a response to the points raised in the submissions and proposed amendments to be made to the draft CMP. The original submissions are attached in Appendix 1.

Table 1: Summary of submissions received by type

Submission type	Total no. of submissions
Individual	1
Community Group	1
Government Agency	2
TOTAL	4

Table 2: Summary of formal submissions, responses and proposed amendments to the draft CMP

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
1.	Lismore City Council Greg Yopp, Senior Strategic Planner	1.1.	LCC has reviewed the draft RCC Catchment Management Plan. Hydrosphere Consulting has captured the risk assessment outcomes of the October workshops accurately. The catchment management actions are clear and concise and display a nexus with catchment risks.	Noted	None
		1.2.	LCC notes point 6 of Section 7.3 Wilsons River Source Catchment Actions: *Implementation of development controls in recognition of the RCC Drinking Water Catchment Overlay providing additional protection for drinking water when local council assesses new developments.* Lismore LEP 2012 and Lismore DCP provide a clear pathway for the assessment of development applications within drinking water catchments. The LEP Drinking Water Catchment Map identifies land within the catchment. This map determines the application of LEP clause 6.4 Drinking Water Catchments which provides heads of consideration for the development assessment process with the aim of protecting water quality and quantity. Lismore DCP Part A Chapter 22 Water Sensitive Design provides more detailed controls for stormwater management for certain categories of development that require consent. Water Sensitive Design principles seek to ensure that developments are designed, constructed and maintained to minimise impacts on the natural water cycle.	The CMP recognises the controls already in place and aims to ensure they continue to be effective.	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		1.3.	LCC also notes point 7 of Section 7.3 Wilsons River Source Catchment Actions: *RCC to liaise with LCC, BSC and BySC regarding progress and implementation of relevant management plans, strategies and works (i.e. OSSM strategies; stormwater management and improvement; LCC sewer replacement/renewal program; relevant DCPs etc).* The Lismore Urban Stormwater Management Plan was adopted by Council in May 2016. The plan generally applies to Council's asset management functions with objectives focusing on stormwater quality and quantity. The Lismore On-site Sewage and Wastewater Management Strategy 2013 provides guidelines for on-site sewage and wastewater management for single domestic households and aims to, among other things, protect the environment and public health. The strategy provides buffer distances from watercourses with the aim to maintain high water quality standards inside and outside of water catchment areas. LCC also operates the 'Rural Landholder Initiative' (RLI), a program that aims to promote healthy land and waterways. Council employs a part time extension officer for the program. The RLI involves private landholder funding opportunities associated with restoration/management of high conservation values areas across the Local Government Area. Of particular relevance to RCC, the RLI supports fencing for stock exclusion and off stream watering; and bush regeneration works for native riparian vegetation on the floodplain.	The CMP recognises the controls already in place and aims to ensure they continue to be effective.	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		1.4.	On a minor editorial note associated with the draft RCC plan, references to NSW legislation require checking. The following legislation in the draft plan either has an incorrect date or missing word: • *Environmental Planning and Assessment Act 1979;* • *Contaminated Land Management Act 1997; and* • *Biodiversity Conservation Act 2016.*	Noted	Check naming and amend accordingly
2.	NSW National Parks and Wildlife Service (NPWS) Damien Hofmeyer Manager, Richmond River Area North Coast Branch	2.1.	NPWS comments generally relate to the Rocky Creek Dam due to the interlinked nature of the Rocky Creek Dam (RCD) catchment within the NPWS reserve system. For the most part our comments are of an editorial nature rather than suggested changes to actions or priorities.	Noted	None
		2.2.	In reviewing the draft RCC Catchment Management Plan NPWS found that the plan was well considered, well presented and easily understood. The actions were generally within the scope and authority of RCC and where assistance is needed the draft RCC Catchment Management Plan identifies the relationships/partnerships with relevant support agencies for RCC to operationalise the actions.	Noted	None
		2.3.	NPWS acknowledges the transparency in which RCC presented the Dunoon dam and the land tenure impact prediction.	Noted	None
		2.4.	Suggested edits: 3.1.2 snapshot of issues. Page 9. Remove reference to State Forest. Justification: There is no State Forest within the RCD. The last piece of State Forest within the RCD transferred to NPWS in 2003.	Noted	Amend as suggested

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		2.5.	Table 1. Page 12. Note 1 "Key potential sources of risk to raw drinking water quality are summarised as: • Recreational use – human waste enters watercourse from recreational activities (e.g. swimming) carrying harmful microbial pathogens." Comment: This is a very good and relevant note. Acknowledge the importance of what is stated.	Noted	None
		2.6.	7.1.3 Strategy 3. Action A4 Suggestion: Add an additional action. "RCC and support agencies run an exercise testing the preparedness and response to any spills/contamination issues within the catchment or water treatment plant." Justification: Preparation and practice to identify any shortcomings is best done in controlled way rather than in heat of real emergency.	The CMP identifies the need for and actions associated with improved notification protocols. The recommendation from NPWS addresses the need for specific operational responses at Nightcap WTP - the justification provided by NPWS is accepted. Rather than include this as an action within the CMP, given the need to ensure that this issue is integrated with both operational considerations and the planning of chemical storage infrastructure, it is proposed that this action be addressed as part of the current audit of RCC's Environment Action List. The scope of this audit will be expanded to conduct a preparedness review for a major chemical spill at Nightcap WTP. This will consider potential spill scenarios, the potential for contamination of surface waters, the level of preparedness for these scenarios, existing procedures/resources available to respond to an incident of this nature and recommended actions to improve preparedness.	None
		2.7.	7.2.1 Strategy 4. Action RC11. Point 3. a. Finish sentence after the word "bushfire" and remove word originating in "National Parks Estate". Justification: It is erroneous to state or insinuate that fires all originate on NPWS estate. NPWS acknowledge that the 2019 fire originated in NPWS estate as result of lightning strike.	Noted	Amend as suggested

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		2.8.	1. 7.2.1 Strategy 4. Action RC11. Point 3. a and b. "Collaborate with NPWS in the review of the *Nightcap National Park, Whian Whian State Conservation Area and Snows Gully Nature Reserve Fire Management Strategy* (NPWS, 2005) incorporating considerations from the post-bushfire review. Based on preliminary review the following updates are required to the fire management strategy: a. Acknowledge and include RCC infrastructure (i.e. RCD and WTP) as a critical public asset in the catchment with potential to be negatively impacted by bushfire originating in National Parks Estate. b. Include RCC as a contact in the plan." NPWS acknowledge that points "a" and "b" are valid suggestions for inclusion on the reserve fire management strategy.	Noted	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		2.9.	7.2.1 Strategy 4. Action RC11. Point 3. c. Remove point 3 c. Justification: Point 3 states that "Based on preliminary review the following updates are required to the fire management strategy:" Point "c" then states "Updates as recommended by the post-bushfire review currently underway". The action is neither informative, specific or in consideration of the legal obligations that govern NPWS fire management. There are a number of post-fire reviews underway and at this point no actions or recommendations have been delivered. The NSW Government and respective fire agencies will provide guidance on any alterations to fire management at the conclusion of internal departmental reviews and the current independent public inquiry. NPWS will review the existing fire management strategy in light of the recent fires to ensure the strategy takes on learnings from the recent fires. The fire management strategy will have to remain consistent with the Far North Coast Bushfire Risk Management Plant.	Noted	Amend as suggested
		2.10.	Appendix 2 Page 61. Ref R37. Possible additional mitigation activities. Dot point 3 and 4 (discussing additional actions to address bushfire risk) Remove either dot point 3 or 4 as they are duplications of each other. Dot point 4 is included in without break in dot point 3. Advise limiting commentary on rainforest burning unless RCC has statistics it is willing to publish and back up.	Noted	Amend as suggested

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		2.11.	Appendix 2 Page 61. Ref R37. Notes. Suggest: RCC alter the notes to simply say vegetation types rather than naming the vegetation. Advise limiting commentary on rainforest burning. Justification: Much debate exists around what is rainforest and what is not. Vegetation mapping is both narrow and broad in its groupings. Is rainforest inclusive or exclusive of eucalypt species? Depending your answer, the hectares of rainforest could grow or decline.	Noted	Amend as suggested
		2.12.	The draft RCC Catchment Management Plan comes across as a well-considered and achievable plan. NPWS looks forward to continuing our working relationship with RCC.	Noted	None
3.	Pacific Farms Macadamia Nuts Johann Oosthuizen Farm Manager	3.1.	Objection to the proposed Pesticide Notification Protocol (refer Appendix 1 for full submission).	The project team has reviewed this action to better reflect the intended aims	Amend Action EC23 to encourage application of the Australian Macadamia Society (AMS) best-practice guidelines regarding pesticide notifications.
4.	Richmond Landcare Incorporated Lyn Walker Secretary Jim Kinkhead Chairperson	4.1.	Email received 13th May advising that the organisation was interested in providing comment but will be late with their submission. Submission was provided on 18th May 2020 by email. Details discussed below.	Noted	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		4.2.	We commend the efforts so far in preparing a document and draft plan for the management of water catchments under Rous County Council (RCC) control and the invitation to comment on the Draft Catchment Management Plan 2021-2015 (CMP). These are critical initiatives. Part of RLI's mission is to support environmental monitoring, education, on ground works, and regional partnerships, so we wholeheartedly support the initiatives described. They are certainly a step in the right direction. Part of our mission is to raise the standard of environmental custodianship. To this end, we would like to provide some constructive criticisms about the draft CMP. We recognise the constraints. We may also be off the mark at time in a zealousness to care. We are being intentionally hyper-critical so as to assist RCC to be the best service provider it can be.	Noted	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		4.3.	1) Too Limited in Scope and Ambition As the largest water extraction business in the Richmond catchment, with approximately $38 million income (2018-2019), we believe that RCC has the capacity, potential and the obligation to commit much further to catchment health initiatives and strategic planning than what is expressed in this document.	The key focus of the CMP is the protection of drinking water quality as required by the Australian Drinking Water Guidelines. It addresses the discrete requirement of RCC's "catchment to tap" management approach recommended in the Australian Drinking Water Guidelines (ADWG) and required by the Public Health Act 2010 and Public Health Regulation 2012. The CMP covers the "catchment to treatment plant" component of the water supply system and forms part of the RCC Drinking Water Quality Management System. Whilst RCC agrees that a broader regional approach is required to progress catchment health in the Richmond River, this needs to be guided by the Richmond River Catchment Governance and Funding Framework – a project that is currently with DPIE to progress with the NSW Government. This is a Richmond River catchment-wide initiative and RCC is committed to working collaboratively with all catchment stakeholders to achieve these broader catchment health goals.	None
		4.4.	A 5-year strategy is concrete and manageable but for an organisation this size with intergenerational responsibilities it would be good to reference the medium and long game and position this plan in the continuum.	The 5-year implementation schedule is considered to be an appropriate and achievable timeframe in which to implement actions and reflects the RCC Integrated Planning and Reporting commitments. Action A9 provides a mechanism to review CMP progress and monitoring of performance targets to ensure continuous improvement and that actions and approaches remain appropriate. Review and update of the Catchment Risk Assessments will allow for targeted actions to be developed accordingly every 5 years.	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		4.5.	Climate change is not mentioned nor is the multitude of risks from a sequence of dry years.	The targeted actions within the CMP 2021-2025 – whilst involving some carbon sequestration initiatives – are primarily focussed on the identified drinking water quality risks. RCC has a series of initiatives that address climate change risks including the Greenhouse Gas (GHG) Abatement Strategy, over 100 ha of water supply buffer zone areas under active restoration, and through its Future Water Supply Strategy.	None
		4.6.	There is little reference to any linkages with RCC's initiatives on nature-based flood mitigation – something RCC put on the regional priority list as the Northern Rivers Watershed Initiative but has no plan to implement in this key document.	These are concurrent programs which were identified in Stage 1 of the CMP and documented in Appendix 1 Status of Existing RCC Catchment Management Plan (CMP) Actions. RCC is committed to these initiatives which are being pursued through alternate mechanisms.	None
		4.7.	There is little on linking weeds management in catchments– another primary responsibility of RCC.		
		4.8.	There is little reference to how the strategic plan relates to and supports other government initiatives such as the Marine Estate Plan.		
		4.9.	2) <u>Address the Governance Issue</u> Recently there was a Richmond River Governance and Funding Project, which RCC was part of. A report on the outcomes of this project is with councils for endorsement. One of the recommendations was that a coordinator to be appointed to support the development of a Collaborative Partnership. We would encourage RCC to progress the recommendations in this report, acknowledge in this document the state of affairs in relation to coordinated catchment management, a show how the plan might mesh with this.	The Richmond River Catchment Governance and Funding Framework is a project that is currently with DPIE to progress to work with all catchment stakeholders across the 6,850 km^2 catchment of the Richmond River. The CMP 2021-2025 is focussed on specific objectives within the RCC drinking water catchments – a total area of 635 km^2 – less than 10% of the area of the Richmond River catchment. RCC is committed to these initiatives which are being pursued through alternate mechanisms.	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		4.10.	3) Add Creative Change is going to require capturing the public's and landowner's hearts and imaginations and keeping it there. The best environmental managers are inspired, connected, resourced and empowered. Putting up the fences along creeks will come afterwards. The actions listed are technical and science based, or generally a rehashing of previous strategies. Whilst important, we believe much more could be done to spark the community up. It doesn't seem fresh enough. Consider creative expertise.	See 4.3. regarding scope and aims of the CMP. The recommended management actions are logical outcomes of the existing information collected, knowledge of past successes and failures (refer Appendix 1 of CMP) the current status of catchments and catchment risks (refer Appendix 2 of CMP) and input from key stakeholders (e.g. catchment risk assessment workshops etc.).	Add sub section to Section 2: Background, to summarise the process undertaken and outcomes of Stage 1 (status of actions) and Stage 2 (risk assessment) reports including discussion of the catchment stakeholder workshops.
		4.11.	4) More Data needed to educate and inform decision making The snapshot of land uses in each of the catchments could have been more informational by showing historical trends and anticipated future trends. The maps do not inform the actions of the strategic plan e.g. by showing areas on which say the "river reach" plans are to focus, or where the pesticide sampling, or water quality monitoring is to take place for example.	Refer 4.10 above regarding detailed review of information and development of the CMP. Mapping of past/current and ongoing River Reach Actions is provided in Appendix 1 of CMP. Exact locations of sites for recommended extension of River Reach Plans are to be confirmed by initial site audits and planning as part of CMP implementation. The discrete monitoring programs (e.g. water quality, pesticides) provide details of site locations etc.).	
		4.12.	Information could have been provided on water quality testing locations and trends over time. How extensive is the proposed pesticide monitoring program? Just at water source points or taken regularly throughout the catchment?	A review of RCC' s water quality monitoring program and was undertaken as part of the Risk Assessment (refer section 2.3 of the CMP and Appendix 2). The pesticide program is currently under development, separate from the CMP.	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		4.13.	It would have also been good to have more reflection on past CMPs and how this CMP springboards of those. For example, detailed evaluation of projects such as sediment control from intensive horticulture, discussion of why some failed and how this plan has evolved its response from there. There was a note about the failure of uptake by grazing properties for the River Reach plan in the previous CMP but nothing in this CMP taking up that challenge.	The Status of Existing RCC Catchment Management Plan (CMP) Actions (see Appendix 1 of the CMP) provides a detailed breakdown of past CMPs, the status of actions, discussion of barriers to success and recommendations for future work to be implemented as part of the current CMP. Actions WR15 and EC19 for Wilsons River and Emigrant Creek catchments both highlight areas for future work including: *"Target grazing land and promote the exclusion of stock from accessing waterways (e.g. watercourse fencing, off-stream watering points, improved stock crossings etc.)."*	None
		4.14.	More financial analysis of the relative weighting of on ground catchment water quality work vs water treatment infrastructure and operational costs would make it clear to the public how critical catchment health investment is and the economic sense to increase it. More financial comparisons of past CMP's on ground works might reassure us that investment is growing.		
		4.15.	<u>5) Too Limited in Budget</u> The draft plan indicates some expenditure for catchment programs, with an expressed need to rely on grants and partnership funding. These aren't a solid commitment, so the CMP then has another fundamental weakness. For its own contribution, the plan shows an understated financial commitment to catchment health by RCC. This needs to be addressed (refer Appendix 1 for full submission).	Funding for catchment actions as part of the overall bulk water supply operation is ultimately provided through constituent councils who themselves have very constrained capacity to fund higher levels of service – accordingly the identified funding is considered appropriate given the limited capacity of constituent councils and has been workshopped with RCC (including representatives of the constituent Councils).	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		4.16.	6) Needs to address strategic development of RCC skillset and values system The document goes some way towards funding education, engagement and awareness ($35k each year over 5 years). It is assumed this is directed at the public, and states special emphasis on new landholders- the outsiders. Details of how RCC expects to improve values and actions in the existing population could have been covered more (refer Appendix 1 for full submission). Looking within the human resources of RCC for such change is not covered in the document and is a fantastic strategic planning opportunity to be listed in a CMP. A CMP needs to address this values and skills imbalance by recognising the organisational deficiencies and taking appropriate steps. Additional recruitment for catchment health challenges is something to consider.	Refer 4.15. Proposed actions, resourcing and funding have been developed with input from stakeholders to address identified communication needs (see 4.18 – stakeholder engagement).	None
		4.17.	7) Disagree with a priority on Table 8 We question the priority ranking on Table 8: Pharmaceutical endocrine disrupting compounds should be classed as high risk not medium.	Action A8: Investigate Potentially Harmful Contaminants refers to pharmaceuticals, endocrine disrupting compounds etc. and is assigned priority ranking of 'Medium'. This rank comes from the relative risk assessment ranking across 3 catchments (see Risk Assessment Report, Appendix 2 of CMP, developed with input from stakeholders at the risk assessment workshops). The risk is 'Low' for Rocky Creek Dam, the main water supply, with no potential sources of these contaminants, 'Medium' for Wilsons Source (potential sources from on-site sewage systems, livestock and STP discharge), 'Medium' for Emigrant Creek Source (potential sources from on-site sewage systems and livestock). The action is to conduct testing of raw water to better define the risk level.	None

No.	Stakeholder	Ref #	Summarised Content/Points Raised	Response to Submission	Proposed Amendment to draft CMP
		4.18.	8) Partnerships have not really been fostered in developing the plan RLI has come in to comment on this plan at the last moment without specific invitation. We have been working with catchment health initiatives for some time and have partnered with RCC on a number of projects. The Richmond catchment is one of our focal areas. Ideally more time at the table would have strengthened our working relationship and enhanced the plan.	Key catchment stakeholders were identified and contacted at the outset of the project. All were contacted and invited to join the Catchment Risk Assessment Working Group and to attend Risk Assessment Workshops in October 2019. This included the following Landcare Groups: Richmond Landcare Inc. (contact: Hannah Rice Hayes; Jeremy Stewart), Big Scrub Landcare (contact: Shannon Greenfields), Brunswick Valley Landcare (contact: Alison Ratcliffe). None of the Landcare invitees attended the workshops. Jeremy Stewart (RLI) provided input via email following the workshops. The workshop minutes and copy of powerpoint slides were distributed to all invitees for comment in November 2019. Appendix 2 provides details of stakeholder workshops.	Refer 4.10
		4.19.	**In Conclusion** RCC's goal of "fully functioning ecosystems and productive, clean water," (from RCC website) is something Landcare strongly identifies with. This draft CMP has some fundamental flaws which hinder its effectiveness as a tool to achieve this mutually important goal. We expect RCC to lead with a best practise, inspired and fairly resourced plan. We encourage a deep revision of what has been submitted for approval.	Noted. See above commentary.	None

REFERENCES

Hydrosphere Consulting (2020). *Rous County Council Catchment Management Plan 2021-2025_Draft for Public Exhibition*. Prepared in behalf of Rous County Council.

APPENDIX 1. WRITTEN SUBMISSIONS

Our ref: GY:EF19/320-02:ED20/10716

Your ref:

Contact: Greg Yopp

6 May 2020

Phillip Rudd
General Manager
Rous County Council
PO Box 230
LISMORE NSW 2480

Dear Mr Rudd

Re: Public exhibition - draft Rous County Council Catchment Management Plan 2021 - 2025

Thank you for the opportunity to provide comment regarding the draft Rous County Council (RCC) Catchment Management Plan 2021 – 2025. Lismore City Council (LCC) is a key stakeholder in the water supply area managed by RCC and was also a contributor to the RCC Catchment Risk Assessment Workshops in October 2019.

LCC have reviewed the draft RCC Catchment Management Plan. Hydrosphere Consulting have captured the risk assessment outcomes of the October workshops accurately. The catchment management actions are clear and concise and display a nexus with catchment risks.

LCC notes point 6 of Section 7.3 Wilsons River Source Catchment Actions:

> *Implementation of development controls in recognition of the RCC Drinking Water Catchment Overlay providing additional protection for drinking water when local council assesses new developments.*

Lismore LEP 2012 and Lismore DCP provide a clear pathway for the assessment of development applications within drinking water catchments. The LEP Drinking Water Catchment Map identifies land within the catchment. This map determines the application of LEP clause 6.4 *Drinking Water Catchments* which provides heads of consideration for the development assessment process with the aim of protecting water quality and quantity. Lismore DCP Part A Chapter 22 *Water Sensitive Design* provides more detailed controls for stormwater management for certain categories of development that require consent. Water Sensitive Design principles seek to ensure that developments are designed, constructed and maintained to minimise impacts on the natural water cycle.

LCC also notes point 7 of Section 7.3 Wilsons River Source Catchment Actions:

> *RCC to liaise with LCC, BSC and BySC regarding progress and implementation of relevant management plans, strategies and works (i.e. OSSM strategies; stormwater management and improvement; LCC sewer replacement/renewal program; relevant DCPs etc).*

The Lismore Urban Stormwater Management Plan was adopted by Council in May 2016. The plan generally applies to Council's asset management functions with objectives focusing on stormwater quality and quantity.

The Lismore On-site Sewage and Wastewater Management Strategy 2013 provides guidelines for on-site sewage and wastewater management for single domestic households and aims to, among other things, protect the environment and public health. The strategy provides buffer distances from watercourses with the aim to maintain high water quality standards inside and outside of water catchment areas.

LCC also operates the 'Rural Landholder Initiative' (RLI), a program that aims to promote healthy land and waterways. Council employs a part time extension officer for the program. The RLI involves private landholder funding opportunities associated with restoration/management of high conservation values areas across the Local Government Area. Of particular relevance to RCC, the RLI supports fencing for stock exclusion and off stream watering; and bush regeneration works for native riparian vegetation on the floodplain.

On a minor editorial note associated with the draft RCC plan, references to NSW legislation require checking. The following legislation in the draft plan either has an incorrect date or missing word:

- *Environmental Planning and Assessment Act 1979*;
- *Contaminated Land Management Act 1997*; and
- *Biodiversity Conservation Act 2016*.

Should you require any further information, please do not hesitate to contact me on 1300 878387.

Yours faithfully

Greg Yopp
Senior Strategic Planner

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Katie Pratt

From: Damien Hofmeyer <Damien.Hofmeyer@environment.nsw.gov.au>
Sent: Tuesday, 12 May 2020 12:43 PM
To: Katie Pratt
Subject: Draft RCC Catchment Management Plan now on Public Exhibition

Attention General Manager Rous County Council via Hydrosphere Consulting

The purpose of this email is to provide comment on the draft Rous County Council (RCC) Catchment Management Plan. The NSW National Parks and Wildlife Service (NPSW) thanks you for the opportunity to comment on the draft plan.

NPWS comments generally relate to the Rock Creek Dam due to the interlinked nature of the Rocky Creek Dam (RCD) catchment within the NPWS reserve system. For the most part our comments are of an editorial nature rather than suggested changes to actions or priorities.

In reviewing the draft RCC Catchment Management Plan NPWS found that the plan was well considered, well presented and easily understood. The actions were generally within the scope and authority of RCC and where assistance is needed the draft RCC Catchment Management Plan identifies the relationships/partnerships with relevant support agencies for RCC to operationalise the actions.

NPWS acknowledges the transparency in which RCC presented the Dunoon dam and the land tenure impact prediction.

Suggested edits:

- 3.1.2 snapshot of issues. Page 9.
  Remove reference to State Forest.
  Justification: There is no State Forest within the RCD. The last piece of State Forest within the RCD transferred to NPWS in 2003.
- Table 1. Page 12. Note 1.
  Comment: This is a very good and relevant note. Acknowledge the importance of what is stated.
- 7.1.3 Strategy 3. Action A4
  Suggestion: Add an additional action. “RCC and support agencies run an exercise testing the preparedness and response to any spills/contamination issues within the catchment or water treatment plant.”
  Justification: Preparation and practice to identify any shortcomings is best done in controlled way rather than in heat of real emergency.
- 7.2.1 Strategy 4. Action RC11. Point 3. a.
  Finish sentence after the word “bushfire” and remove word originating in “National Parks Estate”.
  Justification: It is erroneous to state or insinuate that fires all originate on NPWS estate. NPWS acknowledge that the 2019 fire originated in NPWS estate as result of lightning strike.
- 7.2.1 Strategy 4. Action RC11. Point 3. a and b.
  NPWS acknowledge that points “a” and “b” are valid suggestions for inclusion on the reserve fire management strategy.
- 7.2.1 Strategy 4. Action RC11. Point 3. c.
  Remove point 3 c.
  Justification: Point 3 states that “Based on preliminary review the following updates are required to the fire management strategy:” Point “c” then states “Updates as recommended by the post-bushfire review currently underway”. The action is neither informative, specific or in consideration of the legal obligations that govern NPWS fire management.
  There are a number of post-fire reviews underway and at this point no actions or recommendations have been delivered. The NSW Government and respective fire agencies will provide guidance on any alterations to fire

management at the conclusion of internal departmental reviews and the current independent public inquiry. NPWS will review the existing fire management strategy in light of the recent fires to ensure the strategy takes on learnings from the recent fires. The fire management strategy will have to remain consistent with the Far North Coast Bushfire Risk Management Plant.

- Appendix 2 Page 61. Ref R37. Possible additional mitigation activities. Dot point 3 and 4
  Remove either dot point 3 or 4 as they are duplications of each other. Dot point 4 is included in without break in dot point 3.
  Advise limiting commentary on rainforest burning unless RCC has statistics it is willing to publish and back up.
- Appendix 2 Page 61. Ref R37. Notes.
  Suggest: RCC alter the notes to simply say vegetation types rather than naming the vegetation.
  Advise limiting commentary on rainforest burning.
  Justification: Much debate exists around what is rainforest and what is not. Vegetation mapping is both narrow and broad in it's groupings. Is rainforest inclusive or exclusive of eucalypt species? Depending your answer the hectares of rainforest could grow or decline.

The draft RCC Catchment Management Plan comes across as a well considered and achievable plan. NPWS looks forward to continuing our working relationship with RCC.

Should you wish to clarify or discuss any of the comments above please contact myself.

Damien

Damien Hofmeyer
Manager, Richmond River Area
North Coast Branch
NSW National Parks & Wildlife Service

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Kyogle Office: 136 Summerland Way, Kyogle 2474

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Katie Pratt

From: Johann Oosthuizen <johann@macadamia.com.au>
Sent: Tuesday, 12 May 2020 9:13 PM
To: Katie Pratt
Cc: Jane O'Brien
Subject: Emigrant Creek

To Whom It May Concern

Please accept my objection to the proposed Pesticide Notification Protocol carried out by Hydrosphere Consulting. This proposal has not taken into consideration the following factors in regards to farming.

1. Weather: As farmers we are constantly being affected by the weather and our ability to carry out the cultural practices required to maintain a sustainable business. A minimum notification of 24hrs or 48 hrs is a very long time in farming. Periods this long will and does cause great economic damage to the business by not being able to apply chemicals. It is totally unfeasible to have such a scenario forced upon our farming operations.
2. Thresholds: As landholders we scout for pests and only spray once an economic threshold is exceeded. This threshold can easily be exceeded in 24-48hrs and cause huge damage to the crop. Certain pests and diseases require a certain active ingredient to be effective in eliminating these pests and diseases. Until these are identified it is impossible to give notification on what active is required to be applied.
3. Please familiarise yourself and Hydrosphere with a government authority called the, Australian Pesticides and Veterinary Medicines Authority, (APVMA) and the role they play when a chemical is registered for a certain crop. As a former employee (Senior Research Scientist) of a Private Agricultural Research Company called Eurofins, I am totally aware of the research required for a chemical to be registered. This includes residue tests and the role NATA has in this, usage patterns and label rates.
4. Not sure what qualification Hydrosphere has to advise on Best-practice measures. These are already on the label of the chemical to be applied that has been approved by the APVMA. A reminder that the APVMA is a government authority.
5. As farmers, we have “the right to farm” and be the custodians of our land. By imposing an uneducated protocol without consultation and a proper understanding of what it requires to manage a farming business is totally unfair and unjustified. This clearly shows that, this document has not been carried by a company that, does not have any farming expertise, yet you have asked them to make a decision on our livelihoods.
6. If you require information what is best to protect our natural resources, do your due diligence and get some expertise in all fields that are covered by Hydrosphere.
7. Speak to those who lives you are going to have an impact on. Not just landholders but those who depend on these landholders to feed their families.

Regards
Johann Oosthuizen

Johann Oosthuizen
Farm Manager
Mobile: 0488731523

Leading The Way

johann@macadamia.com.au
www.macadamia.com.au
300 Stanley River Rd
Maleny QLD 4552

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Response to Draft Rous Catchment Management Plan 2021-2025.

May 2020

Introduction

We commend for the efforts so far in preparing a document and draft plan for the management of water catchments under Rous County Council (RCC) control and the invitation to comment on the Draft Catchment Management Plan 2021-2015 (CMP). These are critical initiatives.

Richmond Landcare Incorporated (RLI) is a voluntary organisation that supports 88 or so individual Landcare groups in the catchment and 55 school Landcare groups. We actively coordinate, support and fund a range of environmental enhancement and advocacy initiatives and have a particular interest in waterway health in the Richmond Catchment.

We are linked in with Regional, State and National Landcare groups and have it as a stated priority to be a part of strategic conversations and linkages in the region. We regularly partner with various government and grant bodies to deliver on ground projects.

Part of RLI's mission is to support environmental monitoring, education, on ground works, and regional partnerships, so we wholeheartedly support the initiatives described. They are certainly a step in the right direction.

Part of our mission is to raise the standard of environmental custodianship. To this end, we would like to provide some constructive criticisms about the draft CMP. We recognise the constraints. We may also be off the mark at time in a zealousness to care. We are being intentionally hyper critical so as to assist RCC to be the best service provider it can be.

We ask you to read and consider the following critique.

Criticisms

1) Too Limited in Scope and Ambition

Whilst the document states its focus for 2021-2025 is on "direct issues… issues solely in the control of RCC… and focusses work on RCC land"; it misses an important opportunity to lead in the catchment health space that RCC has stated it wishes to be considered a leader, and that sorely needs quality leadership.

As the largest water extraction business in the Richmond catchment, with approximately $38 million income (2018-2019), we believe that RCC has the capacity, potential and the obligation to commit much further to catchment health initiatives and strategic planning than what is expressed in this document.

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A 5 year strategy is concrete and manageable but for an organisation this size with intergenerational responsibilities it would be good to reference the medium and long game and position this plan in the continuum.

There are plenty and various challenges to catchment health which are likely to intensify over time.

A lot of good catchment management strategies take a lot of time to work at – legislation – coordination-funding. Greater indigenous participation is not flagged or facilitated yet a stated aim of RCC.

Not putting them in CMP with corresponding actions and budgets ignores these as serious issues so they don't get addressed.

Climate change is not mentioned nor is the multitude of risks from a sequence of dry years.

There is little reference to any linkages with RCC's initiatives on nature-based flood mitigation – something RCC put on the regional priority list as the Northern Rivers Watershed Initiative but has no plan to implement in this key document. There is little on linking weeds management in catchments– another primary responsibility of RCC.

There is little reference to how the strategic plan relates to and supports other government initiatives such as the Marine Estate Plan.

2) Address the Governance Issue

As acknowledged in the CMP, there are many players in the complex area of river health and water quality.

There have been a number of meetings over the years in recognition of the significant and ongoing issues the Richmond River catchment is dealing with.

Recently there was a Richmond River Governance and Funding Project, which RCC was part of.

A report on the outcomes of this project is with councils for endorsement.

One of the recommendations was that a coordinator to be appointed to support the development of a Collaborative Partnership.

We would encourage RCC to progress the recommendations in this report, acknowledge in this document the state of affairs in relation to coordinated catchment management, a show how the plan might mesh with this.

3) Add Creative.

Change is going to require capturing the public's and landowner's hearts and imaginations and keeping it there. The best environmental managers are inspired, connected, resourced and empowered.

Putting up the fences along creeks will come afterwards.

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The actions listed are technical and science based, or generally a rehashing of previous strategies. Whilst important, we believe much more could be done to spark the community up. It doesn't seem fresh enough.

Consider creative expertise.

4) More Data needed to educate and inform decision making

The snapshot of land uses in each of the catchments could have been more informational by showing historical trends and anticipated future trends. The maps do not inform the actions of the strategic plan eg by showing areas on which say the "river reach" plans are to focus, or where the pesticide sampling, or water quality monitoring is to take place for example.

Information could have been provided on water quality testing locations and trends over time. How extensive is the proposed pesticide monitoring program? Just at water source points or taken regularly throughout the catchment?

It would have also been good to have more reflection on past CMPs and how this CMP springboards of those. For example, detailed evaluation of projects such as sediment control from intensive horticulture, discussion of why some failed and how this plan has evolved its response from there. There was a note about the failure of uptake by grazing properties for the River Reach plan in the previous CMP but nothing in this CMP taking up that challenge.

More financial analysis of the relative weighting of on ground catchment water quality work vs water treatment infrastructure and operational costs would make it clear to the public how critical catchment health investment is and the economic sense to increase it.

More financial comparisons of past CMP's on ground works might reassure us that investment is growing.

Give people the information they need, resource quality report and planning.

5) Too Limited in Budget

The draft plan indicates some expenditure for catchment programs, with an expressed need to rely on grants and partnership funding.

These aren't a solid commitment, so the CMP then has another fundamental weakness.

For its own contribution, the plan shows an understated financial commitment to catchment health by RCC. This needs to be addressed.

In this document there is $1 134 000 over 5 years being budgeted for implementing this CMP. Of that $590 000 is budgeted for on ground works (River Reach extension in Emigrant Creek ($240K) and Wilsons Creek Catchments ($300K), and Farm Sediment Work ($50K). All over a 5 year period.

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If income for RCC stabilises at its current rate ($38 million Per Annum) it will have income of $190 million over that 5 years. This document is effectively stating that RCC is committing just .3 of 1% of their income to environmental on ground works in the catchments and just .6 of 1% of their income to the whole of their CMP implementation over 5 years.

(It is noted that some of the CMP budget also seems to be in areas of monitoring water quality and policy evaluation. Is this related to improving catchment health or operational matters of water extraction?)

Could the deal be simplified as: "We propose, you agree is fair, that for every $1000 Mother Earth gives us in water revenue, we only want to help her out by $3. And we want to lock this in for five years."? Write that up as feature of the deal so that it makes clear to the community what this proposal boils down to.

Although granted these are grossly simplified numbers (e.g. RCC funds on ground works in other areas of its operational budget), just let those portions of a percentage sink in as a broad representation of what is being proposed here and the values message that it is sending out to the community.

The catchment will not become healthy if our leading water authority does not prioritise it on par with its extraction ambitions.

6) Needs to address strategic development of RCC skillset and values system

The document goes some way towards funding education, engagement and awareness ($35k each year over 5 years). It is assumed this is directed at the public, and states special emphasis on new landholders- the outsiders. Details of how RCC expects to improve values and actions in the existing population could have been covered more.

Once again, the $ commitment could be vastly increased in line with the financial capacity of RCC, and the need to improve norms and a sense of common custodianship of waterway health.

Looking within the human resources of RCC for such change is not covered in the document and is a fantastic strategic planning opportunity to be listed in a CMP.

If the above analysis of RCC's spending priorities on the CMP has a grain of truth it begs further questions about the operational culture of RCC and its value system. Perhaps the organisation is skilled in water engineering and managers who value water engineering over healthy catchments. Nothing wrong with that unless your aim is supporting healthy catchments.

Which is a stated aim of RCC.

Maybe the skills to push through the knotty challenges of catchment health aren't there in enough supply and the choice has been to accept and treat poor quality water rather than addressing the principle issues.

A CMP needs to address this values and skills imbalance by recognising the organisational deficiencies and taking appropriate steps.

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Additional recruitment for catchment health challenges is something to consider.

7) Disagree with a priority on Table 8

We question the priority ranking on Table 8: Pharmaceutical endocrine disrupting compounds should be classed as high risk not medium.

8) Partnerships have not really been fostered in developing the plan

RLI has come in to comment on this plan at the last moment without specific invitation. We have been working with catchment health initiatives for some time and have partnered with RCC on a number of projects. The Richmond catchment is one of our focal areas. Ideally more time at the table would have strengthened our working relationship and enhanced the plan

In Conclusion

RCC's goal of "fully functioning ecosystems and productive, clean water," (from RCC website) is something Landcare strongly identifies with.

This draft CMP has some fundamental flaws which hinder its effectiveness as a tool to achieve this mutually important goal.

We expect RCC to lead with a best practise, inspired and fairly resourced plan.

We encourage a deep revision of what has been submitted for approval.

In support and cooperation,

Richmond Landcare Incorporated.

Deferral and refund of developer contributions – Byron Bay Preschool

(2524/16)

Business activity priority	Strategy and planning
Goal 2	Align strategic direction to core functions and sustainability

Recommendation

That Council, under clause 2.5 of Council's Development Servicing Plan 2016, approve the deferral and refund of the Rous County Council developer contributions, levied to Byron Bay Preschool in relation to DA10.2019.146.1.

Background

The purpose of the report is to recommend to Council that it approve the deferral and refund of the bulk water developer contributions in relation to Development Application No: 10.2019.146.1.

The proposed development of Byron Bay Preschool is for *alterations and additions to an existing child care centre including increase in enrolment numbers to fifty (50) children and tree removal* at 49/51 Bottlebrush Crescent, Suffolk Park.

In May 2020, the development applicant, Thomson Adsett, on behalf of the Byron Bay Preschool, wrote to Rous County Council (RCC) requesting a refund of already paid developer contributions in relation to Development Application number 10.2019.146.1 (Attachment 1)). Payment of $14,671.44 was made on 27 May 2020 to Byron Shire Council, who act as agent for collection of Rous bulk water developer contributions.

The RCC Development Servicing Plan for Bulk Water Supply 2016 makes provision for Council to defer developer contributions in certain circumstances. The applicable clause in the Plan is reproduced below:

> *"2.5 Exemption*
>
> *Rous Water may defer developer contributions where the proponent demonstrates to Rous Water's satisfaction that it is a non-profit and charitable organisation, which by virtue of carrying out such development, is considered by Rous Water to be making a significant and positive contribution to the community and is unable to recover the charge from the end user".*

Byron Bay Preschool Inc. is a non-profit, community-based organisation registered with the Australian Charities and Not-for-profits Commission. The organisation's Australian Business Number is 24821183036. The publicly available information on the organisation, from the Australian Charities and Not-for-profits Commission website, is included as Attachment 2.

Governance

Finance

Council's Development Servicing Plan for Bulk Water Supply 2016 provides for the deferral of developer contributions for a non-profit and charitable organisation (clause 2.5).

Based on advice received from Byron Shire Council staff advising the deferral of Byron Shire Council developer contributions and publicly available information confirming the organisation's non-profit status, granting the request for deferral would be appropriate.

Historically, the number of requests received, and subsequent financial impact of deferrals granted has been low and is considered insignificant in terms of impact on Council's overall financial position.

Legal

Refer to comments in the body of the report.

Consultation

Consultation has been between Rous County Council staff, Thomson Adsett on behalf of the Byron Bay Preschool and Byron Shire Council staff.

Conclusion

It is recommended that the developer contribution, otherwise payable to Rous County Council, be deferred and refunded in accordance with clause 2.5 of the Development Servicing Plan, in relation to Development Application No: 10.2019.146.1 for Byron Bay Preschool Inc. located at 49/51 Bottlebrush Crescent, Suffolk Park.

Refund of the contributions will be processed once the funds have been remitted to Rous County Council from Byron Shire Council. This is expected to occur in late June 2020.

Andrew Logan
Planning Manager

Attachments

1. Letter from Thomson Adsett, on behalf of the Byron Bay Preschool
2. Australian Charities and Not-for-profits Commission Information Form - Byron Bay Preschool Inc.

Attachment 1

Brisbane
128 Robertson Street
Fortitude Valley
QLD 4006 Australia
Telephone +61 7 3840 9999
Facsimile +61 7 3252 1201
Thomson Adsett Pty Ltd
ACN 105 314 654
thomsonadsett.com

27/05/2020

Rous County Council
PO Box 230,
Level 4, 218-232 Molesworth Street
LISMORE NSW 2480

thomson adsett

RE: Refund of Bulk Water Contributions

To Whom It May Concern,

On behalf of our client, Byron Bay Preschool, we would like to request a refund of Bulk Water contributions.

The preschool is a registered non-profit charity and is unlikely to recover the cost from the end user.

The preschool has received a Development Application approval from Byron Shire Council, reference number 10.2019.146.1, and has made the payment of $14,671.44 on 27th of May 2020 to expedite the release of Construction Certificate and start of construction on site.

We trust the Council will consider our request and are looking forward to the response.

Best regards,

Sinisa Ostojic
Architect | Senior Associate

(on behalf of Byron Bay Preschool)

Email: sinisa.ostojic@thomsonadsett.com
Phone: 07 3840 9984

Attachment 2

Australian Government | Australian Charities and Not-for-profits Commission

BYRON BAY PRE SCHOOL INC

- Charity is registered
- Charity reporting is up to date

Charity details

ABN:
24821183036

Address:
5 Coogera Cct
Suffolk Park NSW 2481
Australia

Email:
admin@byronbaypreschool.org.au

Address For Service email:
admin@byronbaypreschool.org.au

Website:
www.byronbaypreschool.org.au

Charity Size:
Large

Who the charity helps:
Early childhood - aged under 6
Families

Date established:
1974

Last reported:
13 May 2020

Next report due:
30 June 2021

Financial Year End:
31/12

Summary of activities

Our preschool delivers quality education and aids in preparing children aged between 3 and 5 years for school through the delivery of the Early Years Learning Framework. More: www.byronbaypreschool.org.au

Where the charity operates

States:

NSW

Using the information on the Register

Information on the Charity Register has been provided to the ACNC by charities. If information is not shown, this may be because it has not yet been provided. The ACNC may also approve information be withheld from the Charity Register in certain circumstances. Read more about information on the Charity Register.

Annual reporting

TITLE	DUE DATE	DATE RECEIVED	DOWNLOAD
Financial Report 2020	30 June 2021	Not yet submitted	—
Annual Information Statement 2020	30 June 2021	Not yet submitted	—
Financial Report 2019	31 August 2020	13 May 2020	Download
Annual Information Statement 2019	31 August 2020	13 May 2020	View AIS
Financial Report 2018	30 June 2019	11 April 2019	Download
Annual Information Statement 2018	30 June 2019	11 April 2019	View AIS
Financial Report 2017	30 June 2018	24 May 2018	Download
Annual Information Statement 2017	30 June 2018	24 May 2018	View AIS
Financial Report 2016	30 June 2017	18 April 2017	Download

TITLE	DUE DATE	DATE RECEIVED	DOWNLOAD
Annual Information Statement 2016	30 June 2017	18 April 2017	View AIS
Financial Report 2015	30 June 2016	26 April 2016	Download
Annual Information Statement 2015	30 June 2016	26 April 2016	View AIS
Financial Report 2014	30 June 2015	28 April 2015	Download
Annual Information Statement 2014	30 June 2015	28 April 2015	View AIS
Annual Information Statement 2013	30 June 2014	15 April 2014	View AIS
Financial Report 2013	No due date	Not required	—

Documents

TITLE	DATE	REPORTING YEAR	DOWNLOAD
Annual Report	24 May 2018	2017	Download
Governing Document	18 July 2013		Download

Responsible People

The role of a 'Responsible Person' is an important one for registered charities. Generally, a charity's Responsible People are its board or committee members, or trustees.

Ashley Griffin

Secretary

View profile →

Bridget Isichei

Director

The charity's subtype history

PURPOSE	START DATE	END DATE
Advancing education	1 January 2014	—
2012 Advancement of education	3 December 2012	31 December 2013

Registration status history

EFFECTIVE DATE	STATUS
3 December 2012	Registered

Enforcement action history

There have been no enforcements for this charity.

Enforcement action refers to the exercise of powers under the ACNC Act.

Public Interest Disclosures policy - amendment

(172)

Business activity priority	Information and knowledge
Goal 3	Create value through applying knowledge

Recommendation

That Council:

1. Revoke the Public Interest Disclosures policy, being attachment 2 to this report, and any policy revived as a result of that revocation.
2. Adopt the draft Public Interest Disclosures policy at attachment 1 to this report.

Background

Council received and adopted an updated policy for Public Interest Disclosures at its April 2020 meeting. The policy was prepared in accordance with the *Public Interest Disclosures Act 1994*.

Following the policy being adopted, an internal review of positions in the Risk and Compliance team has been finalised. That review has resulted in the Governance Advisor position being identified as an additional position to receive Public Interest Disclosure reports. Accordingly, the policy requires amendment to reflect the change.

Governance

The policy has been reviewed and updated by Council's Governance staff.

Finance

Not applicable.

Environment

Not applicable

Legal

The *Public Interest Disclosures Act 1994* at sections 6D and 6E require Council to have a policy for receiving and managing public interest disclosures. This policy satisfies those requirements.

Consultation

The amendment to this policy is minor in nature and reflects positional changes made within the Risk and Compliance team.

Conclusion

To reflect changes made within the Risk and Compliance team and the subsequent reallocation of tasks to the Governance Advisor role, it is recommended that the attached amended policy be adopted.

Helen McNeil
Group Manager People and Performance

Attachments:

1. Proposed amended Public Interest Disclosures policy
2. Public Interest Disclosures policy dated 15 April 2020

Attachment 1 (proposed policy)

Policy

Public interest disclosures
Approved by Council: 15/04/2020

To establish an internal reporting system for councillors and staff to report wrongdoing without fear of reprisal.

Safety Teamwork Accountability Respect

Background

Rous County Council ("Council") is entrusted to manage its assets, people and resources in a responsible, ethical and efficient manner. To ensure Council maintains its position of trust, it acknowledges

- the faith and trust placed in it by the community and other government entities
- the expectation that Council staff and Councillors perform their duties to the highest standard and in compliance with the law; and
- the need for clear avenue for reporting any activities which fall below the standards of ethical and proper conduct.

Council achieves these objectives by ensuring a system for reporting any conduct or activities of Councillors or staff which does not meet the objectives of the various legislation which governs Council's activities.

The mechanism for reporting any instances of conduct by Councillors or Council staff which falls below the high standards of conduct expected, is established by the *Public Interest Disclosures Act 1994* (the Act) which sets in place a system to support public officials in reporting serious wrongdoing.

This policy is designed to further Council's commitment to transparency and accountability, and the objects of the Act by documenting the reporting system for the making of disclosures about corrupt conduct, maladministration, serious and substantial waste of public money, breach of the *Government Information (Public Access) Act 2009*, and local government pecuniary interest contravention alleged to have occurred within Council.

Policy statement

Council is committed to a high standard of ethical and accountable conduct and any form of wrongdoing in the workplace will not be tolerated. Councillors and staff who come forward and report wrongdoing are helping to promote Council's Values and the overall good management of Council.

1. Application of this policy

This policy applies to:

- Councillors and staff
- Permanent employees, whether full-time or part-time
- Temporary or casual employees
- Consultants
- Individual contractors working for Council.

2. Purpose and context of this policy

Council is committed to a high standard of ethical and accountable conduct.

The aim of this policy is to support and further the objects of the Act so as toto facilitate disclosure in the public interest, of corrupt conduct, maladministration, serious and substantial waste, government information contravention and local government pecuniary interest contravention by:

a). enhancing and augmenting established procedures for making disclosures concerning such matters, and
b). protecting persons from reprisals that might otherwise be inflicted on them because of those disclosures, and
c). providing for those disclosures to be properly investigated and dealt with.

It should be noted that this policy is not intended to affect the proper administration and management of an investigating authority or public authority (including action that may or is required to be taken in respect of the salary, wages, conditions of employment or discipline of a public official), subject to the following:

a). detrimental action is not to be taken against a person if to do so would be in contravention of the Act, and
b). beneficial treatment is not to be given in favour of a person if the purpose (or one of the purposes) for doing so is to influence the person to make, to refrain from making, or to withdraw a disclosure.

This policy is consistent with and complements Council's Code of Conduct and 'Fraud and Corruption Control' policy.

Council has an information sheet for staff that is based on the NSW Ombudsman's guidelines which supports this policy and Council's broad responsibilities under the Act, such as recording and reporting on reports of wrongdoing.

3. Organisational commitment

Council is committed to and expects Councillors and staff to make every effort to:

- Facilitate a climate of trust, where Councillors and staff are comfortable and confident about reporting wrongdoing.
- Encourage Councillors and staff to come forward if they have witnessed what they consider to be wrongdoing within Council.
- Keep the identity of the Councillor or staff disclosing wrongdoing confidential, wherever possible and appropriate.
- Protect a Councillor or staff who makes a disclosure from any adverse action motivated by their report.
- Deal with reports thoroughly and impartially and if some form of wrongdoing has been found, taking appropriate action to rectify it.
- Keep a Councillor or staff who makes reports informed of progress with the investigation of the report and the outcome.
- Encourage Councillors and staff to report wrongdoing within the Council, but Council but respecting any decision to disclose wrongdoing outside the Council – provided that disclosure outside the Council is made in accordance with the provisions of the PID Act.
- Ensure Managers and Supervisors at all levels in Council understand the benefits of reporting wrongdoing, are familiar with this policy, and aware of the needs of those who report wrongdoing.

- Provide adequate resources, both financial and human, to:
    - encourage reports of wrongdoing
    - protect and support those who report
    - provide training for key personnel
    - investigate allegations
    - properly manage any workplace issues that the allegations identify or create
    - correct any problem that is identified.

Under the Act, the General Manager is responsible for ensuring that:

- Council has an internal reporting policy (this policy)
- Councillors and staff are aware of the contents of the policy and the protections under the Act for people who make public interest disclosures
- Council complies with the policy and its obligations under the Act, and
- The policy delegates at least one staff position as being responsible for receiving public interest disclosures (Disclosures Coordinator).

4. What should be reported?

Any serious wrongdoing you see within Council that fits one or more of the following five categories:

4.1 *Corrupt conduct* is the dishonest or partial exercise of official functions by a public official. For example, this could include:

- the improper use of knowledge, power or position for personal gain or the advantage of others
- acting dishonestly or unfairly, or breaching public trust
- a council official being influenced by a member of public to use their position in a way that is dishonest, biased or breaches public trust.

4.2 *Maladministration* is conduct that involves action or inaction of a serious nature that is contrary to law, unreasonable, unjust, oppressive or improperly discriminatory or based wholly or partly on improper motives. For example, this could include:

- making a decision and/or taking action that is unlawful
- refusing to grant an application for reasons that are not related to the merits of their application

4.3 Serious and substantial waste of public money is the uneconomical, inefficient or ineffective use of resources that could result in losing or wasting public money e.g. this could include:

- not following a competitive tendering process for a large scalelarge-scale contract
- having bad or no processes in place for a system involving large amounts of public funds

4.4 *Breach of the GIPAA* is a failure to properly fulfil functions under that Act. For example, this could include:

- destroying, concealing or altering records to prevent them from being released
- knowingly making decisions that are contrary to the legislation
- directing another person to make a decision that is contrary to the legislation

4.5 ***Local government pecuniary interest contravention*** is a failure to comply with the requirements of the *Local Government Act 1993* (LGA) relating to the management of pecuniary interests. These include obligations to lodge disclosure of interests returns, disclose pecuniary interests at Council and Council committee meetings and leave the meeting while the matter is being discussed. A pecuniary interest is an interest that a person has in a matter because of a reasonable likelihood or expectation of appreciable financial gain or loss to the person. For example, this could include:

- a senior council staff member recommending a family member for a council contract and not declaring the relationship
- a General Manager an undisclosed shareholding in a company competing for a council contract

When complaints are received by a nominated person set out in Section 9, the complaint will be assessed in accordance with the Act. The nominated person will ensure the requirements under the Act are met, including that the reporter is provided within 45 days after the disclosure with:

- a copy of this policy
- an acknowledgment in writing of the receipt of the disclosure

All other wrongdoing or suspected wrongdoing should be reported to a supervisor, to be dealt with in line Council's relevant policies and procedures. This might include matters such as harassment or unlawful discrimination or practices that endanger the health or safety of staff or the public.

Even if these reports are not dealt with as public interest disclosures, Council recognises such reports may raise important issues. Council will respond to all reports and make every attempt to protect the staff member making the report from reprisal.

5. When will a report be treated as public interest disclosure?

5.1 Council will treat a report as a public interest disclosure if it meets the criteria of a public interest disclosure under the Act. These requirements are:

5.1.1 the report must be about one of the following five categories of serious wrongdoing – corrupt conduct, maladministration, serious and substantial waste of public money, breach of the GIPAA, or local government pecuniary interest contravention

5.1.2 the person making the disclosure must honestly believe on reasonable grounds that the information shows or tends to show wrongdoing

5.1.3 the report has to be made to either the General Manager or, for reports about the General Manager the Chair, a position nominated in this policy (see section 9), an investigating authority or in limited circumstances to an MP or journalist (see section 11).

5.2 Reports by staff are not public interest disclosures if they:

5.2.1 mostly question the merits of government policy

5.2.2 are made with the sole or substantial motive of avoiding dismissal or other disciplinary action.

6. How to make a report

A report about wrongdoing can be made in writing or verbally. Written reports are preferred as this can help to avoid any confusion or misinterpretation.

If a report is made verbally, the person receiving the report must make a comprehensive record of the disclosure and ask the person making the disclosure to sign the record. The Councillor or staff member should keep a copy of that record.

7. Can a report be anonymous?

There may be some situations where a staff member or councillor may not want to identify themselves when making a report. Although these reports will still be dealt with by Council, it is best if the person making the report identifies them self. This allows Council to provide any necessary protection and support, as well as feedback about the outcome of any investigation into the allegations.

It is important to realise that an anonymous disclosure may not prevent you from being identified. If the identity of the person who made the report is not known, it is very difficult for Council to prevent any reprisal action against that person should others identify them. Often it is difficult to effectively assess and investigate anonymous reports.

8. Maintaining confidentiality

Council realises that Councillors and staff may want their report to remain confidential. This can help to prevent any reprisal action being taken for reporting wrongdoing.

Council is committed to keeping the identity of the reporter, and the reported wrongdoing, confidential where this is practical and appropriate. To maintain confidentiality and facilitate an investigation, it may be important to keep both the fact a report has been made and the substance of the report confidential. However, there may be situations where maintaining confidentiality is not possible or appropriate. If confidentiality is unable to be maintained, this will be discussed with the person that has made the report.

If confidentiality cannot be maintained, Council, in consultation with the person that has made the report, will develop a plan to support and as best as possible protect the person from any risks of reprisal.

When reporting wrongdoing, it should only be discussed with those dealing with it. This will include the Disclosures Coordinator and the General Manager. If the report is discussed more broadly, it may affect the outcome of any investigation.

9. Who can receive a report within Council?

Council encourages reports of general wrongdoing to be made to Supervisors. However, the Act requires that for a report to be a public interest disclosure it must be made to certain Public Officials identified by this policy.
The following positions are the only people within Council who are authorised to receive a public interest disclosure:

- General Manager
- Chair
- Disclosures Coordinators – Group Manager People and Performance, and Human Services Manager

Any supervisor who receives a report that they believe may be a public interest disclosure is obliged to assist the staff member to make the report to one of the positions listed above. The broader responsibilities of those positions are outlined under the Roles and Responsibilities (section 10).

If your report involves a councillor, you should make it to the General Manager.

If your report relates to the General Manager, you should make it to the Chair.

10. Roles and Responsibilities

10.1 General Manager

You can report wrongdoing directly to the General Manager. The General Manager is responsible for:

- deciding if a report is a public interest disclosure
- determining what needs to be done next, including referring it to other authorities
- deciding what needs to be done to correct the problem that has been identified.

The General Manager must make sure there are systems in place in Council to support and protect Councillors and staff who report wrongdoing. They are also responsible for referring actual or suspected corrupt conduct to the Independent Commission Against Corruption. Notification about receipt of a Public Interest Disclosure may also be made to Council's external auditor.

10.2 Chair

If you are making a report about the General Manager, you should make your report to the Chair. They are responsible for:

- deciding if a report is a public interest disclosure
- determining what needs to be done next, including referring it to other authorities
- deciding what needs to be done to correct the problem that has been identified.

The Chair is also responsible for referring actual or suspected corrupt conduct to the Independent Commission Against Corruption. Notification may also be made to Council's external auditor.

10.3 Disclosures Coordinator

The Disclosures Coordinator has a central role in dealing with reports. They receive them, assess them and deal with them, or refer them to other people within Council that can deal with them. This includes notification of Council's external auditor of Public Interest Disclosures received.

The role of Disclosures Coordinator is delegated to the positions of Group Manager People and Performance, and Human Services Manager.

11. Who can receive a report outside of Council?

11.1 Councillors and staff are encouraged to report wrongdoing within Council, but internal reporting is not the only option available. Reports can also be made to:

- An investigating authority (see 11.2 below and section 21 of this policy) and
- A Member of Parliament (MP) or a journalist, but only in the limited circumstances outlined below.

11.2 The relevant investigating authorities for Council are:

- the ICAC - for reports about corrupt conduct
- the Ombudsman - for reports about maladministration
- the Information Commissioner - for disclosures about a breach of the GIPAA
- the Office of Local Government - for disclosures about local councils.

The relevant investigating authority is able to provide advice about how to make a disclosure to them. Contact details for each investigating authority are provided at the end of this policy.

The investigating authority may discuss any such reports with *Council.* Council will make every effort to assist and cooperate with the investigating authority to ensure the matter is dealt with appropriately and there is a satisfactory outcome. Council will also provide appropriate support and assistance to councillors or staff who report wrongdoing to an investigating authority, if Council is made aware that this has occurred.

11.3 Members of Parliament or journalists

To have the protections of the Act, staff reporting wrongdoing to a Member of Parliament (MP) or a journalist must have already made substantially the same report to one of the following:

- the General Manager
- a person nominated in this policy, including the Chair for reports about the General Manager
- an investigating authority.

Also, Council or the investigating authority that received your initial report must have either:

- decided not to investigate the matter
- decided to investigate the matter, but not completed the investigation within six months of the original report
- investigated the matter but not recommended any action as a result
- not told the person who made the report, within six months of the report being made, whether the matter will be investigated.

Most importantly – to be protected under the Act – if you report wrongdoing to an MP or a journalist you will need to be able to prove that you have reasonable grounds for believing that the disclosure is substantially true and that it is in fact substantially true.

11.4 Other external reporting

If you report wrongdoing to a person or authority that is not listed above or make a report to an MP or journalist without following the steps outlined above, the protections offered under the Act will not apply. This may mean a breach of legal obligations or Council's Code of Conduct – by, for example, disclosing confidential information.

For more information about reporting wrongdoing outside Council, contact the Disclosures Coordinator or the NSW Ombudsman's Public Interest Disclosures Unit. Their contact details are provided at the end of this policy.

12. Feedback to persons who report wrongdoing

A Councillor or staff who report wrongdoing will be told what is happening in response to their report.

When a report is made, the reporter will be given:

- an acknowledgement that the disclosure has been received
- the timeframe for when further updates will be provided
- the name and contact details of the people who will provide updates.

The Act requires that you are provided with an acknowledgement letter and a copy of this policy within 45 days after you have made your report. Council will however attempt to get this information to you within five working days from the date you make your report.

After a decision is made about how the report will be dealt with, Council will send an acknowledgment letter, providing:

- information about the action that will be taken in response to your report
- the likely timeframes for any investigation or other action
- information about the internal and external resources or services available that you can access for support.

Council will provide this information within fifteen working days from the date the report is made. Council will also advise if Council decides to treat the report as a public interest disclosure and provide you with a copy of this policy at that time, as required by the Act.

If a report is made which meets the requirements of the Act but the report was made under a statutory or legal obligation or incidental to the performance of day to day functions or duties, an acknowledgement letter or a copy of this policy will not be provided.

While a report is being dealt with, such as by investigation or making other enquiries, the following will be given:

- information about the progress of the investigation or other enquiries and reasons for any delay
- advice of any decision by Council not to proceed with the matter
- advice if the reporting person's identity needs to be disclosed for the purposes of investigating the matter or making enquiries, and an opportunity to talk about this beforehand.
- Once the matter has been finalised the reporting person will be given:
- enough information to show that adequate and appropriate action was taken and/or is proposed to be taken in response to your disclosure and any problem that was identified
- advice about whether you are likely to be called as a witness in any further matters, such as disciplinary or criminal proceedings.

13. Managing the risk of reprisal and workplace conflict

When a councillor or staff member reports wrongdoing, Council will undertake a thorough risk assessment to identify the risk to the person who made the report, of detrimental action in reprisal for reporting, as well as indirect but related risks of workplace conflict or difficulties. The risk assessment will also identify strategies to deal with those risks and determine the level of protection and support that is appropriate.

Depending on the circumstances, Council may:

- relocate the reporter or the staff member who is the subject of the allegation within the current workplace

- transfer the reporter or the staff member who is the subject of the allegation to another position for which they are qualified
- grant the reporter or the staff member who is the subject of the allegation leave of absence during the investigation of the disclosure

These courses of action are not punishment and will only be taken in consultation with the reporter.

14. Protection against reprisals

Council will not tolerate any reprisal action against a person who reports wrongdoing.

The Act provides protection for Councillors and staff who have made a public interest disclosure by imposing penalties on anyone who takes detrimental action against another person substantially in reprisal for that person making a public interest disclosure. These penalties also apply to cases where a person takes detrimental action against another because they believe or suspect the other person has made or may have made a public interest disclosure, even if they did not.

Detrimental action means action causing, comprising or involving any of the following:

- injury, damage or loss
- intimidation or harassment
- discrimination, disadvantage or adverse treatment in relation to employment
- dismissal from, or prejudice in, employment
- disciplinary proceedings.

A person who is found to have committed a reprisal offence may face criminal penalties such as imprisonment and/or fines and may be required to pay the victim damages for any loss suffered as a result of the detrimental action. Taking detrimental action in reprisal is also a breach of the Council's Code of Conduct which may result in disciplinary action. In the case of councillors, such disciplinary action may be taken under the misconduct provisions of the LGA and may include suspension or disqualification from civic office.

It is important for councillors and staff to understand the nature and limitations of the protection provided by the Act. The Act protects reporters from detrimental action being taken against them because they have made, or are believed to have made, a public interest disclosure. It does not protect reporters from disciplinary or other management action where Council has reasonable grounds to take such action.

15. Responding to allegations of reprisal

If you believe that detrimental action has been or is being taken against you or someone else in reprisal for reporting wrongdoing, you should tell your supervisor, the Disclosures Coordinator or the *General Manager* immediately. In the case of an allegation of reprisal by the General Manager, you can alternatively report this to the Chair.

All supervisors must notify the Disclosures Coordinator or the *General Manager* if they suspect that reprisal against a staff member is occurring or has occurred, or if any such allegations are made to them. In the case of an allegation of reprisal by the *General Manager*, the Chair can alternatively be notified.

If Council becomes aware of or suspects that reprisal is being or has been taken against a person who has made a disclosure, Council will:

- assess the allegation of reprisal to decide whether the report should be treated as a public interest disclosure and whether the matter warrants investigation or if other action should be taken to resolve the issue
- if the reprisal allegation warrants investigation, ensure this is conducted by a senior and experienced member of staff
- if it is established that reprisal is occurring against someone who has made a report, take all steps possible to stop that activity and protect the reporter
- take appropriate disciplinary action against anyone proven to have taken or threatened any action in reprisal for making a disclosure
- refer any breach of Part 9 of Council's Code of Conduct (reprisal action) by a councillor or the General Manager to the Office of Local Government.
- refer any evidence of an offence under section 20 of the Act to the ICAC or NSW Police Force.

If an allegation of reprisal is substantiated, the person alleging the reprisal will be kept informed of the progress and outcome of any investigation or other action taken in response to the allegation.

If you have reported wrongdoing and are experiencing reprisal which you believe is not being dealt with effectively, contact the Office of Local Government, the Ombudsman or the ICAC (depending on the type of wrongdoing you reported). Contact details for these investigating authorities are included at the end of this policy.

16. Protection against legal action

If a public interest disclosure is made in accordance with the Act, the reporter will not be subject to any liability, and no action, claim or demand can be taken against the reporter for having made the public interest disclosure. This disclosure will not have breached any confidentiality or secrecy obligations and you will have the defence of absolute privilege in defamation.

17. Support for those reporting wrongdoing

Council will make sure that staff who have reported wrongdoing, regardless of whether their report is treated as a public interest disclosure, are provided with access to any professional support they may need as a result of the reporting process, such as counselling services.

Access to support may also be available for other staff involved in the internal reporting process where appropriate. Reporters and other staff involved in the process can discuss their support options with the Disclosures Coordinator.

18. Sanctions for making false or misleading statements

It is important all councillors and staff are aware that it is a criminal offence under the Act to wilfully make a false or misleading statement when reporting wrongdoing. Council will not support councillors or staff who wilfully make false or misleading reports. Such conduct may also be a breach of Council's Code of Conduct resulting in disciplinary action.

In the case of councillors, disciplinary action may be taken under the misconduct provisions of the Local Government Act and may include suspension or disqualification from civic office.

19. The rights of persons the subject of a report

Council is committed to ensuring councillors or staff who are the subject of a report of wrongdoing are treated fairly and reasonably. This includes keeping the identity of any person the subject of a report confidential, where this is practical and appropriate.

If you are the subject of the report, you will be advised of the allegations made at an appropriate time and before any adverse findings. At this time, you will be:

- advised of the details of the allegation
- advised of your rights and obligations under the Act and the relevant related policies
- kept informed about the progress of any investigation
- given a reasonable opportunity to respond to any allegation made against you
- told the outcome of any investigation, including any decision made about whether further action will be taken against you.

Where the reported allegations against the subject officer are clearly wrong, or have been investigated and unsubstantiated, the subject officer will be supported by Council. The fact of the allegations and any investigation will be kept confidential unless otherwise agreed to by the subject officer.

20. More information

More information around public interest disclosures is available on our intranet. Staff can also seek advice and guidance from the Disclosures Coordinator and the NSW Ombudsman's website at www.ombo.nsw.gov.au.

21. Resources

The contact details for external investigating authorities that staff can make a public interest disclosure to or seek advice from are listed below (correct at publication).

For disclosures about corrupt conduct:
Independent Commission Against Corruption (ICAC)
Phone: 02 8281 5999
Toll free: 1800 463 909
Facsimile: 02 9264 5364
Email: icac@icac.nsw.gov.au
Web: www.icac.nsw.gov.au
Address: L21, 133 Castlereagh Street, Sydney

For disclosures about maladministration:
NSW Ombudsman
Phone: 02 9286 1000
Toll free (outside Sydney metro): 1800 451 524
Facsimile: 02 9283 2911
Email: nswombo@ombo.nsw.gov.au
Web: www.ombo.nsw.gov.au
Address: L24, 580 George Street, Sydney 2000

For disclosures about serious and substantial waste:
Auditor-General of the NSW Audit Office
Phone: 02 9275 7100
Facsimile: 02 9275 7200
Email: mail@audit.nsw.gov.au
Web: www.audit.nsw.gov.au
Address: L15, 1 Margaret Street, Sydney 2000

For disclosures about local councils:
Office of Local Government
Phone: 02 4428 4100
Facsimile: 02 4428 4199
Email: dlg@dlg.nsw.gov.au
Web: www.dlg.nsw.gov.au
Address: 5 O'Keefe Avenue, Nowra, NSW 2541

For disclosures about breaches of the GIPAA:
Information Commissioner
Toll free: 1800 472 679
Facsimile: 02 8114 3756
Email: ipcinfo@ipc.nsw.gov.au
Web: www.ipc.nsw.gov.au
Address: L11, 1 Castlereagh Street, Sydney

Contact officer
Group Manager People and Performance

Related documents

Policies
Code of Conduct
Feedback and complaints handling
Fraud control
Work Health and Safety

Procedures
HR Procedures Handbook
Public Interest Disclosures

Legislation
Local Government Act 1993
Public Interest Disclosures Act 1994

Other
Public Interest Disclosures Information Sheet (internal document)

Office use only	File no.: 172/13	Next review date: Annually	
Version	Purpose and description	Date adopted by Council	Resolution no.
1.0		21/12/2011	106/11
2.0	To establish an internal reporting system for councillors and staff to report wrongdoing without fear of reprisal.	15/024/2020	17/20

Attachment 2 (current policy)

Policy

Public interest disclosures
Approved by Council: 15/04/2020

To establish an internal reporting system for councillors and staff to report wrongdoing without fear of reprisal.

Safety Teamwork Accountability Respect

Background
Rous County Council ("Council") is entrusted to manage its assets, people and resources in a responsible, ethical and efficient manner. To ensure Council maintains its position of trust, it acknowledges

- the faith and trust placed in it by the community and other government entities
- the expectation that Council staff and Councillors perform their duties to the highest standard and in compliance with the law; and
- the need for clear avenue for reporting any activities which fall below the standards of ethical and proper conduct.

Council achieves these objectives by ensuring a system for reporting any conduct or activities of Councillors or staff which does not meet the objectives of the various legislation which governs Council's activities.

The mechanism for reporting any instances of conduct by Councillors or Council staff which falls below the high standards of conduct expected, is established by the *Public Interest Disclosures Act 1994* (the Act) which sets in place a system to support public officials in reporting serious wrongdoing.

This policy is designed to further Council's commitment to transparency and accountability, and the objects of the Act by documenting the reporting system for the making of disclosures about corrupt conduct, maladministration, serious and substantial waste of public money, breach of the *Government Information (Public Access) Act 2009*, and local government pecuniary interest contravention alleged to have occurred within Council.

Policy statement
Council is committed to a high standard of ethical and accountable conduct and any form of wrongdoing in the workplace will not be tolerated. Councillors and staff who come forward and report wrongdoing are helping to promote Council's Values and the overall good management of Council.

22. Application of this policy

This policy applies to:

- Councillors and staff
- Permanent employees, whether full-time or part-time
- Temporary or casual employees
- Consultants
- Individual contractors working for Council.

23. Purpose and context of this policy

Council is committed to a high standard of ethical and accountable conduct.

The aim of this policy is to support and further the objects of the Act so as toto facilitate disclosure in the public interest, of corrupt conduct, maladministration, serious and substantial waste, government information contravention and local government pecuniary interest contravention by:

d). enhancing and augmenting established procedures for making disclosures concerning such matters, and
e). protecting persons from reprisals that might otherwise be inflicted on them because of those disclosures, and
f). providing for those disclosures to be properly investigated and dealt with.

It should be noted that this policy is not intended to affect the proper administration and management of an investigating authority or public authority (including action that may or is required to be taken in respect of the salary, wages, conditions of employment or discipline of a public official), subject to the following:

c). detrimental action is not to be taken against a person if to do so would be in contravention of the Act, and
d). beneficial treatment is not to be given in favour of a person if the purpose (or one of the purposes) for doing so is to influence the person to make, to refrain from making, or to withdraw a disclosure.

This policy is consistent with and complements Council's Code of Conduct and 'Fraud and Corruption Control' policy.

Council has an information sheet for staff that is based on the NSW Ombudsman's guidelines which supports this policy and Council's broad responsibilities under the Act, such as recording and reporting on reports of wrongdoing.

24. Organisational commitment

Council is committed to and expects Councillors and staff to make every effort to:

- Facilitate a climate of trust, where Councillors and staff are comfortable and confident about reporting wrongdoing.
- Encourage Councillors and staff to come forward if they have witnessed what they consider to be wrongdoing within Council.
- Keep the identity of the Councillor or staff disclosing wrongdoing confidential, wherever possible and appropriate.
- Protect a Councillor or staff who makes a disclosure from any adverse action motivated by their report.
- Deal with reports thoroughly and impartially and if some form of wrongdoing has been found, taking appropriate action to rectify it.
- Keep a Councillor or staff who makes reports informed of progress with the investigation of the report and the outcome.
- Encourage Councillors and staff to report wrongdoing within the Council, but Council but respecting any decision to disclose wrongdoing outside the Council – provided that disclosure outside the Council is made in accordance with the provisions of the PID Act.
- Ensure Managers and Supervisors at all levels in Council understand the benefits of reporting wrongdoing, are familiar with this policy, and aware of the needs of those who report wrongdoing.

- Provide adequate resources, both financial and human, to:
    - encourage reports of wrongdoing
    - protect and support those who report
    - provide training for key personnel
    - investigate allegations
    - properly manage any workplace issues that the allegations identify or create
    - correct any problem that is identified.

Under the Act, the General Manager is responsible for ensuring that:

- Council has an internal reporting policy (this policy)
- Councillors and staff are aware of the contents of the policy and the protections under the Act for people who make public interest disclosures
- Council complies with the policy and its obligations under the Act, and
- The policy delegates at least one staff position as being responsible for receiving public interest disclosures (Disclosures Coordinator).

25. What should be reported?

Any serious wrongdoing you see within Council that fits one or more of the following five categories:

25.1 *Corrupt conduct* is the dishonest or partial exercise of official functions by a public official. For example, this could include:

- the improper use of knowledge, power or position for personal gain or the advantage of others
- acting dishonestly or unfairly, or breaching public trust
- a council official being influenced by a member of public to use their position in a way that is dishonest, biased or breaches public trust.

25.2 *Maladministration* is conduct that involves action or inaction of a serious nature that is contrary to law, unreasonable, unjust, oppressive or improperly discriminatory or based wholly or partly on improper motives. For example, this could include:

- making a decision and/or taking action that is unlawful
- refusing to grant an application for reasons that are not related to the merits of their application

25.3 Serious and substantial waste of public money is the uneconomical, inefficient or ineffective use of resources that could result in losing or wasting public money e.g. this could include:

- not following a competitive tendering process for a large scalelarge-scale contract
- having bad or no processes in place for a system involving large amounts of public funds

25.4 *Breach of the GIPAA* is a failure to properly fulfil functions under that Act. For example, this could include:

- destroying, concealing or altering records to prevent them from being released
- knowingly making decisions that are contrary to the legislation
- directing another person to make a decision that is contrary to the legislation

25.5 ***Local government pecuniary interest contravention*** is a failure to comply with the requirements of the *Local Government Act 1993* (LGA) relating to the management of pecuniary interests. These include obligations to lodge disclosure of interests returns, disclose pecuniary interests at Council and Council committee meetings and leave the meeting while the matter is being discussed. A pecuniary interest is an interest that a person has in a matter because of a reasonable likelihood or expectation of appreciable financial gain or loss to the person. For example, this could include:

- a senior council staff member recommending a family member for a council contract and not declaring the relationship
- a General Manager an undisclosed shareholding in a company competing for a council contract

When complaints are received by a nominated person set out in Section 9, the complaint will be assessed in accordance with the Act. The nominated person will ensure the requirements under the Act are met, including that the reporter is provided within 45 days after the disclosure with:

- a copy of this policy
- an acknowledgment in writing of the receipt of the disclosure

All other wrongdoing or suspected wrongdoing should be reported to a supervisor, to be dealt with in line Council's relevant policies and procedures. This might include matters such as harassment or unlawful discrimination or practices that endanger the health or safety of staff or the public.

Even if these reports are not dealt with as public interest disclosures, Council recognises such reports may raise important issues. Council will respond to all reports and make every attempt to protect the staff member making the report from reprisal.

26. When will a report be treated as public interest disclosure?

26.1 Council will treat a report as a public interest disclosure if it meets the criteria of a public interest disclosure under the Act. These requirements are:

26.1.1 the report must be about one of the following five categories of serious wrongdoing – corrupt conduct, maladministration, serious and substantial waste of public money, breach of the GIPAA, or local government pecuniary interest contravention

26.1.2 the person making the disclosure must honestly believe on reasonable grounds that the information shows or tends to show wrongdoing

26.1.3 the report has to be made to either the General Manager or, for reports about the General Manager the Chair, a position nominated in this policy (see section 9), an investigating authority or in limited circumstances to an MP or journalist (see section 11).

26.2 Reports by staff are not public interest disclosures if they:

26.2.1 mostly question the merits of government policy

26.2.2 are made with the sole or substantial motive of avoiding dismissal or other disciplinary action.

27. How to make a report

A report about wrongdoing can be made in writing or verbally. Written reports are preferred as this can help to avoid any confusion or misinterpretation.

If a report is made verbally, the person receiving the report must make a comprehensive record of the disclosure and ask the person making the disclosure to sign the record. The Councillor or staff member should keep a copy of that record.

28. Can a report be anonymous?

There may be some situations where a staff member or councillor may not want to identify themselves when making a report. Although these reports will still be dealt with by Council, it is best if the person making the report identifies them self. This allows Council to provide any necessary protection and support, as well as feedback about the outcome of any investigation into the allegations.

It is important to realise that an anonymous disclosure may not prevent you from being identified. If the identity of the person who made the report is not known, it is very difficult for Council to prevent any reprisal action against that person should others identify them. Often it is difficult to effectively assess and investigate anonymous reports.

29. Maintaining confidentiality

Council realises that Councillors and staff may want their report to remain confidential. This can help to prevent any reprisal action being taken for reporting wrongdoing.

Council is committed to keeping the identity of the reporter, and the reported wrongdoing, confidential where this is practical and appropriate. To maintain confidentiality and facilitate an investigation, it may be important to keep both the fact a report has been made and the substance of the report confidential. However, there may be situations where maintaining confidentiality is not possible or appropriate. If confidentiality is unable to be maintained, this will be discussed with the person that has made the report.

If confidentiality cannot be maintained, Council, in consultation with the person that has made the report, will develop a plan to support and as best as possible protect the person from any risks of reprisal.

When reporting wrongdoing, it should only be discussed with those dealing with it. This will include the Disclosures Coordinator and the General Manager. If the report is discussed more broadly, it may affect the outcome of any investigation.

30. Who can receive a report within Council?

Council encourages reports of general wrongdoing to be made to Supervisors. However, the Act requires that for a report to be a public interest disclosure it must be made to certain Public Officials identified by this policy.
The following positions are the only people within Council who are authorised to receive a public interest disclosure:

- General Manager
- Chair
- Disclosures Coordinators – Group Manager People and Performance, and Human Services Manager

Any supervisor who receives a report that they believe may be a public interest disclosure is obliged to assist the staff member to make the report to one of the positions listed above. The broader responsibilities of those positions are outlined under the Roles and Responsibilities (section 10).

If your report involves a councillor, you should make it to the General Manager.

If your report relates to the General Manager, you should make it to the Chair.

31. Roles and Responsibilities

31.1 General Manager

You can report wrongdoing directly to the General Manager. The General Manager is responsible for:

- deciding if a report is a public interest disclosure
- determining what needs to be done next, including referring it to other authorities
- deciding what needs to be done to correct the problem that has been identified.

The General Manager must make sure there are systems in place in Council to support and protect Councillors and staff who report wrongdoing. They are also responsible for referring actual or suspected corrupt conduct to the Independent Commission Against Corruption. Notification about receipt of a Public Interest Disclosure may also be made to Council's external auditor.

31.2 Chair

If you are making a report about the General Manager, you should make your report to the Chair. They are responsible for:

- deciding if a report is a public interest disclosure
- determining what needs to be done next, including referring it to other authorities
- deciding what needs to be done to correct the problem that has been identified.

The Chair is also responsible for referring actual or suspected corrupt conduct to the Independent Commission Against Corruption. Notification may also be made to Council's external auditor.

31.3 Disclosures Coordinator

The Disclosures Coordinator has a central role in dealing with reports. They receive them, assess them and deal with them, or refer them to other people within Council that can deal with them. This includes notification of Council's external auditor of Public Interest Disclosures received.

The role of Disclosures Coordinator is delegated to the positions of Group Manager People and Performance, and Human Services Manager.

32. Who can receive a report outside of Council?

32.1 Councillors and staff are encouraged to report wrongdoing within Council, but internal reporting is not the only option available. Reports can also be made to:

- An investigating authority (see 11.2 below and section 21 of this policy) and
- A Member of Parliament (MP) or a journalist, but only in the limited circumstances outlined below.

32.2 The relevant investigating authorities for Council are:

- the ICAC - for reports about corrupt conduct
- the Ombudsman - for reports about maladministration
- the Information Commissioner - for disclosures about a breach of the GIPAA
- the Office of Local Government - for disclosures about local councils.

The relevant investigating authority is able to provide advice about how to make a disclosure to them. Contact details for each investigating authority are provided at the end of this policy.

The investigating authority may discuss any such reports with *Council.* Council will make every effort to assist and cooperate with the investigating authority to ensure the matter is dealt with appropriately and there is a satisfactory outcome. Council will also provide appropriate support and assistance to councillors or staff who report wrongdoing to an investigating authority, if Council is made aware that this has occurred.

32.3 Members of Parliament or journalists

To have the protections of the Act, staff reporting wrongdoing to a Member of Parliament (MP) or a journalist must have already made substantially the same report to one of the following:

- the General Manager
- a person nominated in this policy, including the Chair for reports about the General Manager
- an investigating authority.

Also, Council or the investigating authority that received your initial report must have either:

- decided not to investigate the matter
- decided to investigate the matter, but not completed the investigation within six months of the original report
- investigated the matter but not recommended any action as a result
- not told the person who made the report, within six months of the report being made, whether the matter will be investigated.

Most importantly – to be protected under the Act – if you report wrongdoing to an MP or a journalist you will need to be able to prove that you have reasonable grounds for believing that the disclosure is substantially true and that it is in fact substantially true.

32.4 Other external reporting

If you report wrongdoing to a person or authority that is not listed above or make a report to an MP or journalist without following the steps outlined above, the protections offered under the Act will not apply. This may mean a breach of legal obligations or Council's Code of Conduct – by, for example, disclosing confidential information.

For more information about reporting wrongdoing outside Council, contact the Disclosures Coordinator or the NSW Ombudsman's Public Interest Disclosures Unit. Their contact details are provided at the end of this policy.

33. Feedback to persons who report wrongdoing

A Councillor or staff who report wrongdoing will be told what is happening in response to their report.

When a report is made, the reporter will be given:

- an acknowledgement that the disclosure has been received
- the timeframe for when further updates will be provided
- the name and contact details of the people who will provide updates.

The Act requires that you are provided with an acknowledgement letter and a copy of this policy within 45 days after you have made your report. Council will however attempt to get this information to you within five working days from the date you make your report.

After a decision is made about how the report will be dealt with, Council will send an acknowledgment letter, providing:

- information about the action that will be taken in response to your report
- the likely timeframes for any investigation or other action
- information about the internal and external resources or services available that you can access for support.

Council will provide this information within fifteen working days from the date the report is made. Council will also advise if Council decides to treat the report as a public interest disclosure and provide you with a copy of this policy at that time, as required by the Act.

If a report is made which meets the requirements of the Act but the report was made under a statutory or legal obligation or incidental to the performance of day to day functions or duties, an acknowledgement letter or a copy of this policy will not be provided.

While a report is being dealt with, such as by investigation or making other enquiries, the following will be given:

- information about the progress of the investigation or other enquiries and reasons for any delay
- advice of any decision by Council not to proceed with the matter
- advice if the reporting person's identity needs to be disclosed for the purposes of investigating the matter or making enquiries, and an opportunity to talk about this beforehand.
- Once the matter has been finalised the reporting person will be given:
- enough information to show that adequate and appropriate action was taken and/or is proposed to be taken in response to your disclosure and any problem that was identified
- advice about whether you are likely to be called as a witness in any further matters, such as disciplinary or criminal proceedings.

34. Managing the risk of reprisal and workplace conflict

When a councillor or staff member reports wrongdoing, Council will undertake a thorough risk assessment to identify the risk to the person who made the report, of detrimental action in reprisal for reporting, as well as indirect but related risks of workplace conflict or difficulties. The risk assessment will also identify strategies to deal with those risks and determine the level of protection and support that is appropriate.

Depending on the circumstances, Council may:

- relocate the reporter or the staff member who is the subject of the allegation within the current workplace

- transfer the reporter or the staff member who is the subject of the allegation to another position for which they are qualified
- grant the reporter or the staff member who is the subject of the allegation leave of absence during the investigation of the disclosure

These courses of action are not punishment and will only be taken in consultation with the reporter.

35. Protection against reprisals

Council will not tolerate any reprisal action against a person who reports wrongdoing.

The Act provides protection for Councillors and staff who have made a public interest disclosure by imposing penalties on anyone who takes detrimental action against another person substantially in reprisal for that person making a public interest disclosure. These penalties also apply to cases where a person takes detrimental action against another because they believe or suspect the other person has made or may have made a public interest disclosure, even if they did not.

Detrimental action means action causing, comprising or involving any of the following:

- injury, damage or loss
- intimidation or harassment
- discrimination, disadvantage or adverse treatment in relation to employment
- dismissal from, or prejudice in, employment
- disciplinary proceedings.

A person who is found to have committed a reprisal offence may face criminal penalties such as imprisonment and/or fines and may be required to pay the victim damages for any loss suffered as a result of the detrimental action. Taking detrimental action in reprisal is also a breach of the Council's Code of Conduct which may result in disciplinary action. In the case of councillors, such disciplinary action may be taken under the misconduct provisions of the LGA and may include suspension or disqualification from civic office.

It is important for councillors and staff to understand the nature and limitations of the protection provided by the Act. The Act protects reporters from detrimental action being taken against them because they have made, or are believed to have made, a public interest disclosure. It does not protect reporters from disciplinary or other management action where Council has reasonable grounds to take such action.

36. Responding to allegations of reprisal

If you believe that detrimental action has been or is being taken against you or someone else in reprisal for reporting wrongdoing, you should tell your supervisor, the Disclosures Coordinator or the *General Manager* immediately. In the case of an allegation of reprisal by the General Manager, you can alternatively report this to the Chair.

All supervisors must notify the Disclosures Coordinator or the *General Manager* if they suspect that reprisal against a staff member is occurring or has occurred, or if any such allegations are made to them. In the case of an allegation of reprisal by the *General Manager*, the Chair can alternatively be notified.

If Council becomes aware of or suspects that reprisal is being or has been taken against a person who has made a disclosure, Council will:

- assess the allegation of reprisal to decide whether the report should be treated as a public interest disclosure and whether the matter warrants investigation or if other action should be taken to resolve the issue
- if the reprisal allegation warrants investigation, ensure this is conducted by a senior and experienced member of staff
- if it is established that reprisal is occurring against someone who has made a report, take all steps possible to stop that activity and protect the reporter
- take appropriate disciplinary action against anyone proven to have taken or threatened any action in reprisal for making a disclosure
- refer any breach of Part 9 of Council's Code of Conduct (reprisal action) by a councillor or the General Manager to the Office of Local Government.
- refer any evidence of an offence under section 20 of the Act to the ICAC or NSW Police Force.

If an allegation of reprisal is substantiated, the person alleging the reprisal will be kept informed of the progress and outcome of any investigation or other action taken in response to the allegation.

If you have reported wrongdoing and are experiencing reprisal which you believe is not being dealt with effectively, contact the Office of Local Government, the Ombudsman or the ICAC (depending on the type of wrongdoing you reported). Contact details for these investigating authorities are included at the end of this policy.

37. Protection against legal action

If a public interest disclosure is made in accordance with the Act, the reporter will not be subject to any liability, and no action, claim or demand can be taken against the reporter for having made the public interest disclosure. This disclosure will not have breached any confidentiality or secrecy obligations and you will have the defence of absolute privilege in defamation.

38. Support for those reporting wrongdoing

Council will make sure that staff who have reported wrongdoing, regardless of whether their report is treated as a public interest disclosure, are provided with access to any professional support they may need as a result of the reporting process, such as counselling services.

Access to support may also be available for other staff involved in the internal reporting process where appropriate. Reporters and other staff involved in the process can discuss their support options with the Disclosures Coordinator.

39. Sanctions for making false or misleading statements

It is important all councillors and staff are aware that it is a criminal offence under the Act to wilfully make a false or misleading statement when reporting wrongdoing. Council will not support councillors or staff who wilfully make false or misleading reports. Such conduct may also be a breach of Council's Code of Conduct resulting in disciplinary action.

In the case of councillors, disciplinary action may be taken under the misconduct provisions of the Local Government Act and may include suspension or disqualification from civic office.

40. The rights of persons the subject of a report

Council is committed to ensuring councillors or staff who are the subject of a report of wrongdoing are treated fairly and reasonably. This includes keeping the identity of any person the subject of a report confidential, where this is practical and appropriate.

If you are the subject of the report, you will be advised of the allegations made at an appropriate time and before any adverse findings. At this time, you will be:

- advised of the details of the allegation
- advised of your rights and obligations under the Act and the relevant related policies
- kept informed about the progress of any investigation
- given a reasonable opportunity to respond to any allegation made against you
- told the outcome of any investigation, including any decision made about whether further action will be taken against you.

Where the reported allegations against the subject officer are clearly wrong, or have been investigated and unsubstantiated, the subject officer will be supported by Council. The fact of the allegations and any investigation will be kept confidential unless otherwise agreed to by the subject officer.

41. More information

More information around public interest disclosures is available on our intranet. Staff can also seek advice and guidance from the Disclosures Coordinator and the NSW Ombudsman's website at www.ombo.nsw.gov.au.

42. Resources

The contact details for external investigating authorities that staff can make a public interest disclosure to or seek advice from are listed below (correct at publication).

For disclosures about corrupt conduct:
Independent Commission Against Corruption (ICAC)
Phone: 02 8281 5999
Toll free: 1800 463 909
Facsimile: 02 9264 5364
Email: icac@icac.nsw.gov.au
Web: www.icac.nsw.gov.au
Address: L21, 133 Castlereagh Street, Sydney

For disclosures about maladministration:
NSW Ombudsman
Phone: 02 9286 1000
Toll free (outside Sydney metro): 1800 451 524
Facsimile: 02 9283 2911
Email: nswombo@ombo.nsw.gov.au
Web: www.ombo.nsw.gov.au
Address: L24, 580 George Street, Sydney 2000

For disclosures about serious and substantial waste:
Auditor-General of the NSW Audit Office
Phone: 02 9275 7100
Facsimile: 02 9275 7200
Email: mail@audit.nsw.gov.au
Web: www.audit.nsw.gov.au
Address: L15, 1 Margaret Street, Sydney 2000

For disclosures about local councils:
Office of Local Government
Phone: 02 4428 4100
Facsimile: 02 4428 4199
Email: dlg@dlg.nsw.gov.au
Web: www.dlg.nsw.gov.au
Address: 5 O'Keefe Avenue, Nowra, NSW 2541

For disclosures about breaches of the GIPAA:
Information Commissioner
Toll free: 1800 472 679
Facsimile: 02 8114 3756
Email: ipcinfo@ipc.nsw.gov.au
Web: www.ipc.nsw.gov.au
Address: L11, 1 Castlereagh Street, Sydney

Contact officer
Group Manager People and Performance

Related documents

Policies
Code of Conduct
Feedback and complaints handling
Fraud control
Work Health and Safety

Procedures
HR Procedures Handbook
Public Interest Disclosures

Legislation
Local Government Act 1993
Public Interest Disclosures Act 1994

Other
Public Interest Disclosures Information Sheet (internal document)

Office use only	File no.: 172/13	Next review date: Annually	
Version	Purpose and description	Date adopted by Council	Resolution no.
1.0		21/12/2011	106/11
2.0	To establish an internal reporting system for councillors and staff to report wrongdoing without fear of reprisal.	15/04/2020	17/20

Information reports

(1181)

Business activity priority	Process management, improvement and innovation
Goal 6	Continuous improvement through process management and innovative thinking

Recommendation

That the following information reports be received and noted:

i). Investments – May 2020
ii). Water production and usage – April 2020 and May 2020
iii). Audit, Risk and Improvement Committee: meeting update
iv). Reports/actions pending

Background

Copies of the following reports are attached for information:

i). Investments – May 2020
ii). Water production and usage – April 2020 and May 2020
iii). Audit, Risk and Improvement Committee: meeting update
iv). Reports/actions pending

Governance

Finance

Not applicable.

Legal

Not applicable.

Consultation

Consultation has been undertaken with the General Manager, Group Managers and staff.

Conclusion

Copies of the reports listed are attached for information.

Phillip Rudd
General Manager

Investments – May 2020

(59/12)

Business activity priority	Results and sustainable performance
Goal 7	Sustainable performance

Recommendation
That Council receive and note the investments for May 2020.

Background

Clause 212 of the *Local Government (General) Regulation 2005* and Council's 'Investment' policy require that a report detailing Council's investments be provided. This report has been for 31 May 2020.

Governance

Finance

RBA cash rate

At the RBA's May meeting, it was decided to leave the cash rate at 0.25%. The 90-day average bank bill swap rate (BBSW) has decreased to 0.09%. The low rate will continue to put pressure on interest yields in the foreseeable future.

Total funds invested for May was $36,192,338

This is a decrease of $570,896 compared to the March 2020 figure. This is primarily due to semi-annual loan repayments.

Return for May was 1.82%

The weighted average return on funds invested for the month of May was 1.82%. This represents a decrease of 11 basis point compared to the March result (1.93%) and is 173 basis points above Council's benchmark (the average 90-day BBSW rate of 0.09%) (Refer: Graph D2).

Interest earned for May was $57,041

Interest earned compared to the adjusted budget is $52,150 in excess of pro-rata budget (Refer: Attachment A).

Summary of indebtedness as at 31 May 2020

Information	Loan #1	Loan #2	Loan #3	Loan #4	Loan #5	Loan #6	Loan #7	Total
Institution	CBA	CBA	CBA	Dexia	NAB	NAB	CBA	
Principal Borrowed	$ 2,000,000	$ 3,000,000	$ 10,000,000	$ 10,000,000	$ 10,000,000	$ 10,000,000	$ 550,000	$ 45,550,000
Date Obtained	9-Jun-04	31-May-05	31-May-06	21-Feb-07	31-May-07	25-Sep-07	13-May-05	
Term (Years)	20	20	20	20	20	20	15	
Interest Rate	6.82%	6.25%	6.37%	6.40%	6.74%	6.85%	6.39%	
Date Due	10-Jun-24	31-May-25	31-May-26	21-Feb-27	31-May-27	25-Sep-27	13-May-20	
Annual Commitment	$ 184,785	$ 264,921	$ 891,595	$ 893,507	$ 917,390	$ 925,933	$ 57,571	$ 4,135,701
Principal Repaid LTD	$ 1,294,324	$ 1,877,697	$ 5,612,763	$ 5,020,894	$ 4,653,896	$ 4,634,310	$ 550,000	$ 23,643,886
Interest Incurred LTD	$ 1,569,845	$ 2,096,113	$ 6,869,569	$ 6,596,660	$ 6,813,474	$ 6,939,848	$ 313,560	$ 31,199,068
Principal Outstanding	$ 705,676	$ 1,122,303	$ 4,387,237	$ 4,979,106	$ 5,346,104	$ 5,365,691	$ -	$ 21,906,115
Interest Outstanding	$ 125,856	$ 202,301	$ 962,334	$ 1,276,500	$ 1,555,016	$ 1,590,694	$ -	$ 5,712,702

The final repayment on the legacy loan on behalf of Lismore City Council for the construction of the Lismore levee in 2005 was paid on 13 May 2020.

Cheque account balance as at 31 May 2020 was $171,250

Ethical holdings represent 67.69% of the total portfolio

Current holdings in Ethical Financial Institutions equals $24,500,000. The assessment of Ethical Financial Institutions is undertaken using www.marketforces.org.au which is an affiliate project of the Friends of the Earth Australia (Refer: Graph D4).

Legal

All investments are in accordance with section 625 of the *Local Government Act 1993*, clause 212 of the *Local Government (General) Regulation 2005* and Council's 'Investment' policy.

Consultation

Nil.

Conclusion

A report on investments is required to be submitted to Council. As at 31 May 2020, investments total $36,192,338 and the average rate of return is estimated at 1.82%.

Guy Bezrouchko
Group Manager Corporate and Commercial

Attachments:

A. Investment analysis
B. Investment by type
C. Investment by Institution
D. Total funds invested - comparisons

Rous County Council – Investment Analysis report – 31 May 2020

Attachment A

Funds Invested With	S & P Local Long Term Rating	Product Name	Ethical ADIs	Lodgement Date	Maturity Date	% of Portfolio	31 May 20 Balance	Rate of Return	Monthly Interest	Year-to-Date Interest
CBA Business Online Saver	AA-	CBA-BOS	No	At call		11.58	4,192,338.02	1.20	4,028.79	21,428.77
Bank of Queensland	BBB+	TD	Yes	17/7/2018	14/7/2020	1.38	500,000.00	3.00	1,273.97	13,808.22
Bank of Queensland	BBB+	TD	Yes	24/7/2018	21/7/2020	1.38	500,000.00	3.00	1,273.97	13,808.22
AMP Bank	BBB+	TD	No	21/8/2018	25/8/2020	1.38	500,000.00	2.95	1,252.74	13,578.08
Bendigo & Adelaide Bank Ltd (Rural Bank Div)	BBB+	TD	Yes	6/11/2018	3/11/2020	2.76	1,000,000.00	2.85	2,420.55	26,235.62
Newcastle Permanent Bldg Soc	BBB	TD	Yes	29/1/2019	19/1/2021	1.38	500,000.00	2.95	1,252.74	13,578.08
Newcastle Permanent Bldg Soc	BBB	TD	Yes	19/2/2019	16/2/2021	1.38	500,000.00	2.95	1,252.74	13,578.08
Newcastle Permanent Bldg Soc	BBB	TD	Yes	8/3/2019	2/3/2021	2.76	1,000,000.00	2.85	2,420.55	26,235.62
Auswide Bank Ltd	BBB+	TD	Yes	3/5/2019	4/5/2021	2.76	1,000,000.00	2.55	2,165.75	23,473.97
Firstmac Ltd	UNRATED	TD	Yes	3/5/2019	11/5/2021	1.38	500,000.00	2.75	1,167.81	12,657.53
ME Bank	BBB	TD	Yes	27/8/2019	16/6/2020	2.76	1,000,000.00	1.60	1,358.90	12,230.14
MyState Bank Limited	BBB+	TD	Yes	10/9/2019	2/6/2020	1.38	500,000.00	1.60	679.45	5,808.22
Judo Bank	UNRATED	TD	Yes	17/9/2019	15/9/2020	1.38	500,000.00	2.10	891.78	7,421.92
Judo Bank	UNRATED	TD	Yes	24/9/2019	8/9/2020	1.38	500,000.00	2.20	934.25	7,564.38
AMP Bank	BBB+	TD	No	24/9/2019	22/9/2020	2.76	1,000,000.00	1.70	1,443.84	11,690.41
AMP Bank	BBB+	TD	No	1/10/2019	6/10/2020	2.76	1,000,000.00	1.70	1,443.84	11,364.38
Warwick Credit Union	UNRATED	TD	Yes	15/10/2019	20/10/2020	1.38	500,000.00	1.70	721.92	5,356.16
AMP Bank	BBB+	TD	No	15/10/2019	13/10/2020	1.38	500,000.00	1.60	679.45	5,041.10
The Mutual Bank (Maitland Mutual)	UNRATED	TD	Yes	29/10/2019	27/10/2020	1.38	500,000.00	1.70	721.92	5,030.14
Warwick Credit Union	UNRATED	TD	Yes	1/11/2019	27/10/2020	1.38	500,000.00	1.80	764.38	5,252.05
Australian Military Bank	UNRATED	TD	Yes	1/11/2019	20/10/2020	1.38	500,000.00	1.60	679.45	4,668.49
AMP Bank	BBB+	TD	No	5/11/2019	3/11/2020	1.38	500,000.00	1.65	700.68	4,723.97
Goldfields Money Ltd	UNRATED	TD	Yes	21/11/2019	17/11/2020	1.38	500,000.00	1.75	743.15	4,626.71
MyState Bank Limited	BBB+	TD	Yes	26/11/2019	23/6/2020	1.38	500,000.00	1.55	658.22	3,991.78
Coastline Credit Union Ltd	UNRATED	TD	Yes	26/11/2019	24/11/2020	1.38	500,000.00	1.75	743.15	4,506.85
Defence Bank	BBB	TD	Yes	3/12/2019	1/12/2020	1.38	500,000.00	1.75	743.15	4,339.04
BankVic (Police Financial Services Ltd T/as)	BBB+	TD	Yes	5/12/2019	30/6/2020	1.38	500,000.00	1.70	721.92	4,168.49
BankVic (Police Financial Services Ltd T/as)	BBB+	TD	Yes	10/12/2019	8/12/2020	1.38	500,000.00	1.75	743.15	4,171.23
AMP Bank	BBB+	TD	No	10/12/2019	9/6/2020	1.38	500,000.00	1.80	764.38	4,290.41
AMP Bank	BBB+	TD	No	7/1/2020	7/7/2020	1.38	500,000.00	1.80	764.38	3,600.00
Police Credit Union SA	UNRATED	TD	Yes	14/1/2020	12/1/2021	1.38	500,000.00	1.70	721.92	3,236.99
Police Credit Union SA	UNRATED	TD	Yes	20/1/2020	2/2/2021	1.38	500,000.00	1.70	721.92	3,097.26
The Capricornian Ltd	UNRATED	TD	Yes	21/1/2020	5/1/2021	1.38	500,000.00	1.75	743.15	3,164.38
Bank of Sydney Ltd	UNRATED	TD	Yes	21/1/2020	28/7/2020	1.38	500,000.00	1.85	785.62	3,345.21
Goldfields Money Ltd	UNRATED	TD	Yes	28/1/2020	19/1/2021	1.38	500,000.00	1.65	700.68	2,825.34
Bendigo & Adelaide Bank Ltd (Rural Bank Div)	BBB+	TD	Yes	28/1/2020	4/8/2020	1.38	500,000.00	1.65	700.68	2,825.34

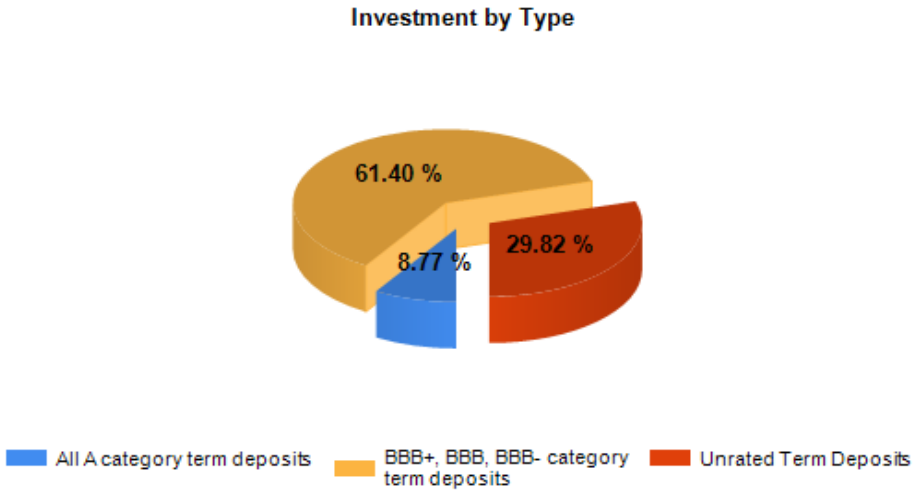
Funds Invested With	S & P Local Long Term Rating	Product Name	Ethical ADIs	Lodgement Date	Maturity Date	% of Portfolio	31 May 20 Balance	Rate of Return	Monthly Interest	Year-to-Date Interest
ING Bank Aust Ltd	A	TD	No	3/2/2020	9/2/2021	1.38	500,000.00	1.65	700.68	2,689.73
Bank of Queensland	BBB+	TD	Yes	4/2/2020	18/8/2020	1.38	500,000.00	1.55	658.22	2,505.48
ING Bank Aust Ltd	A	TD	No	11/2/2020	16/2/2021	2.76	1,000,000.00	1.65	1,401.37	5,017.81
QBank	BBB-	TD	Yes	11/2/2020	11/8/2020	1.38	500,000.00	1.70	721.92	2,584.93
ING Bank Aust Ltd	A	TD	No	18/2/2020	23/2/2021	1.38	500,000.00	1.60	679.45	2,279.45
AMP Bank	BBB+	TD	No	18/2/2020	25/8/2020	1.38	500,000.00	1.90	806.85	2,706.85
MyState Bank Limited	BBB+	TD	Yes	3/3/2020	9/3/2021	2.76	1,000,000.00	1.65	1,401.37	4,068.49
Macquarie Bank Ltd	A	TD	No	6/3/2020	9/6/2020	1.38	500,000.00	1.70	721.92	2,026.03
Auswide Bank Ltd	BBB+	TD	Yes	9/3/2020	29/9/2020	1.38	500,000.00	1.60	679.45	1,841.10
Auswide Bank Ltd	BBB+	TD	Yes	10/3/2020	22/9/2020	1.38	500,000.00	1.60	679.45	1,819.18
MyState Bank Limited	BBB+	TD	Yes	16/3/2020	15/12/2020	1.38	500,000.00	1.75	743.15	1,845.89
MyState Bank Limited	BBB+	TD	Yes	17/3/2020	15/12/2020	1.38	500,000.00	1.75	743.15	1,821.92
Auswide Bank Ltd	BBB+	TD	Yes	28/4/2020	23/3/2021	1.38	500,000.00	1.55	658.22	721.92
Auswide Bank Ltd	BBB+	TD	Yes	28/4/2020	13/4/2021	1.38	500,000.00	1.55	658.22	721.92
Bank of Sydney Ltd	UNRATED	TD	Yes	5/5/2020	10/11/2020	1.38	500,000.00	1.63	602.88	602.88
Summerland Credit Union	UNRATED	TD	Yes	5/5/2020	10/11/2020	1.38	500,000.00	1.80	665.75	665.75
ME Bank	BBB	TD	Yes	12/5/2020	17/11/2020	1.38	500,000.00	1.35	369.86	369.86
Gateway Bank Ltd	UNRATED	TD	Yes	12/5/2020	11/8/2020	1.38	500,000.00	1.25	342.47	342.47
Auswide Bank Ltd	BBB+	TD	Yes	8/10/2019	12/10/2021	1.38	500,000.00	1.65	700.68	5,356.85
Auswide Bank Ltd	BBB+	TD	Yes	22/10/2019	19/10/2021	1.38	500,000.00	1.65	700.68	5,040.41
Auswide Bank Ltd	BBB+	TD	Yes	29/10/2019	26/10/2021	1.38	500,000.00	1.65	700.68	4,882.19
MATURED TDs									1,919.18	374,307.81
						100.00	**36,192,338.02**	**1.82**	**57,040.57**	**740,941.51**
Total Investment Holdings						**100.00**	**36,192,338.02**		**57,040.57**	**740,941.51**

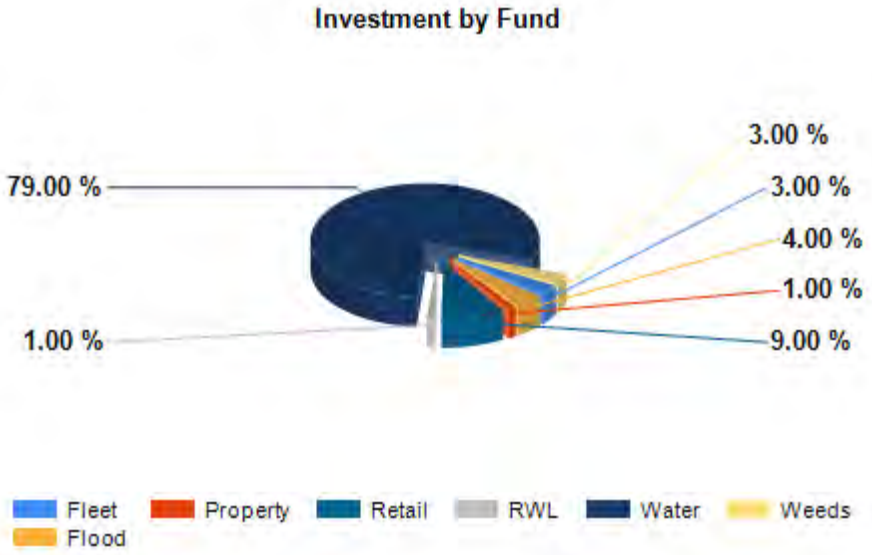
Total YTD Interest **740,941.51**

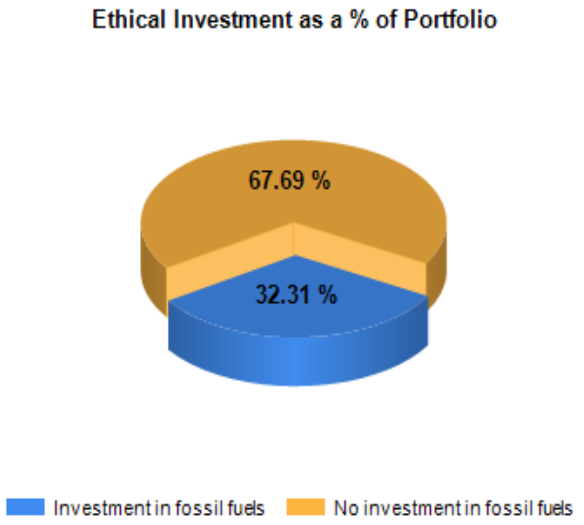
Deposits with Australian Deposit-taking institutions (ADI) are Government.
Guaranteed for balances totalling up to $250,000 per customer, per institution.

Budget Interest @ 31 May 20 **688,791.67**
Budget variance **52,149.84**

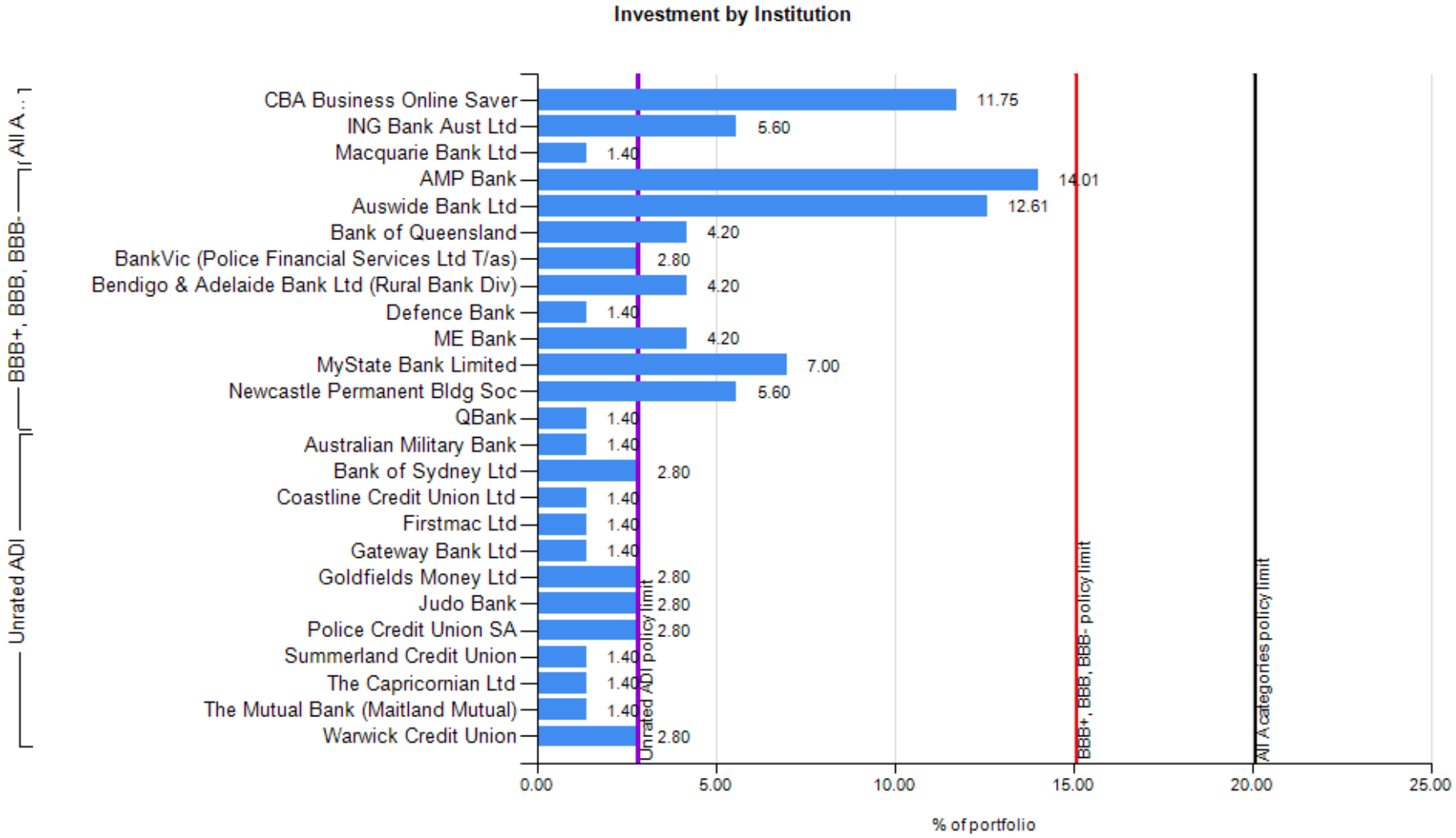
Attachment B





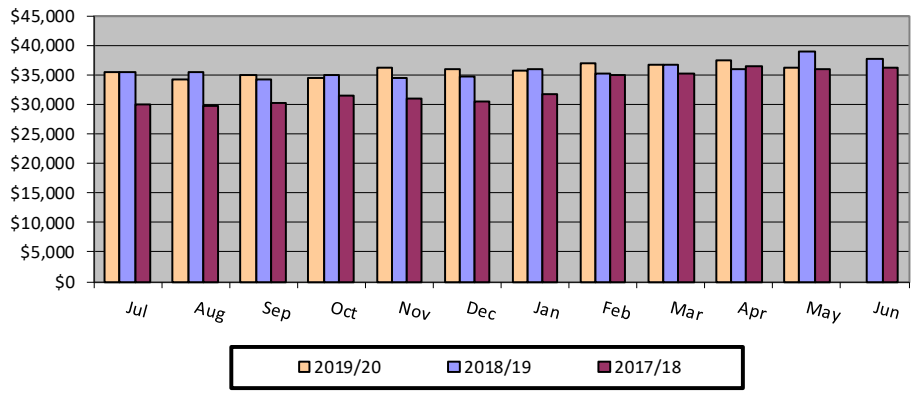


Attachment C



Attachment D

D1



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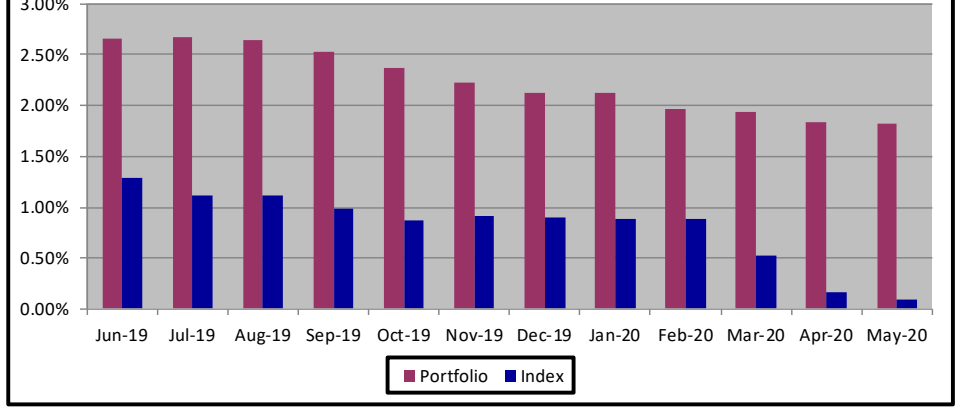

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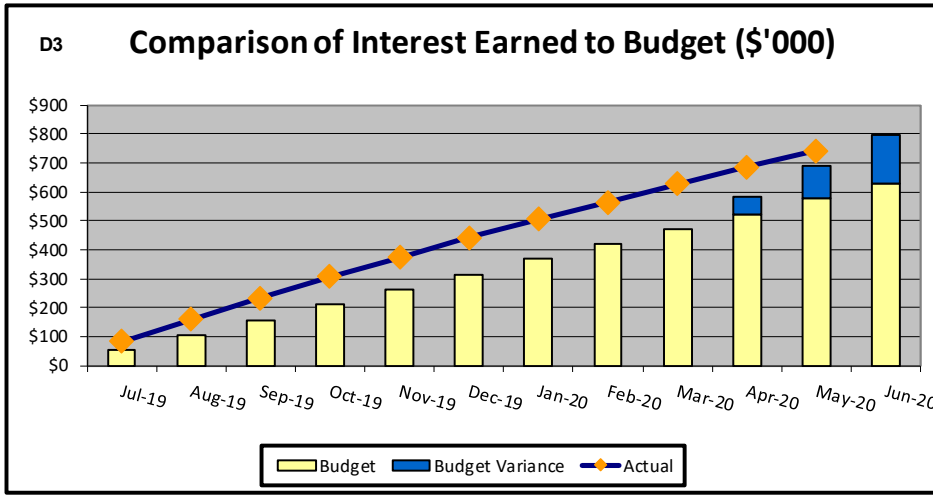
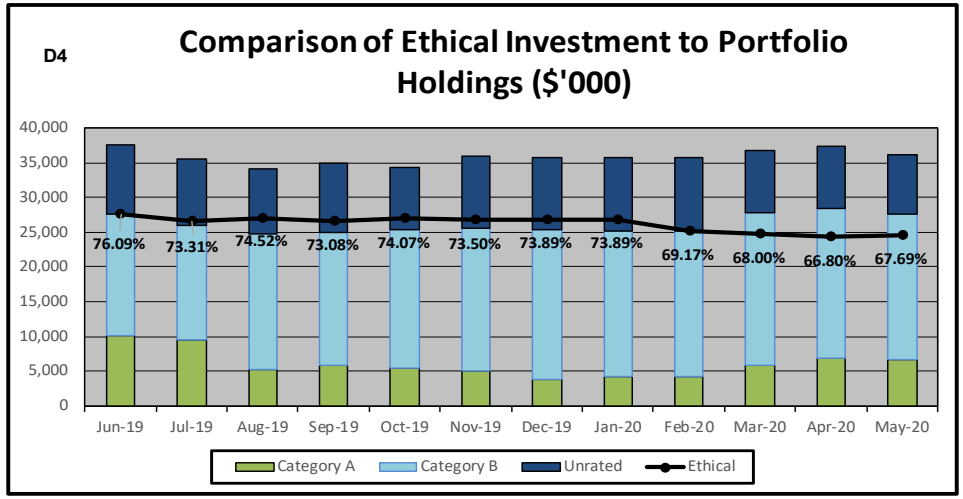


D4



Water production and usage – April 2020 and May 2020

(5/12)

Business activity priority Strategy and planning

Goal 2 Align strategic direction to core functions and sustainability

Background

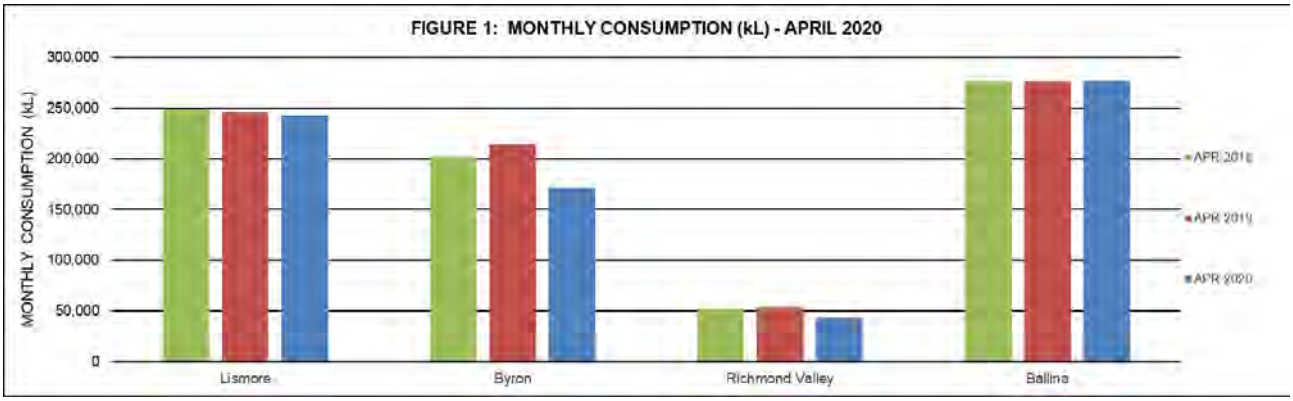
- **Summary for April 2020**

The table below is the April 2020 bulk water sales to the constituent councils in kilolitres compared to March 2020 and the corresponding April for 2018 and 2019.

Council	Council area	Apr 2018	Apr 2019	Mar 2020	Apr 2020	Change on previous year %	% of Total
Lismore City Council	Dunoon/The Channon	11,600	11,554	11,608	13,668		
	Clunes	5,405	3,443	3,895	3,987		
	Pineapple Road	605	310	413	471		
	Holland Street	33,154	35,423	35,048	36,140		
	Ross Street	69,901	67,124	71,614	73,006		
	Tullera	1,934	1,153	1,667	1,544		
	No. 4 Reservoir	33,562	44,279	36,109	36,684		
	No. 9 Reservoir	87,760	78,396	80,361	72,544		
	Tanelawn	4,377	3,695	4,141	4,677		
	North Woodburn	612	662	685	803		
	TOTAL	248,910	246,039	245,541	243,524	↓ 1.02	33.06
Byron Shire Council	Bangalow	16,446	12,636	13,675	13,930		
	Byron Bay	48,596	51,745	42,854	28,560		
	Coopers Shoot	73,070	83,236	66,055	63,753		
	Wategos Beach	4,758	4,452	5,435	6,998		
	Brunswick Heads	14,707	16,376	13,938	13,148		
	Ocean Shores	44,420	45,797	42,773	45,571		
	TOTAL	201,997	214,242	184,730	171,960	↓ 19.74	23.35
Richmond Valley Council	Coraki	9,660	10,136	9,030	9,337		
	Woodburn	4,008	3,630	4,298	4,351		
	Broadwater	11,137	12,720	8,215	6,729		
	Evans Head	27,389	26,958	23,697	23,026		
	TOTAL	52,194	53,444	45,240	43,443	↓ 18.71	5.90
Ballina Shire Council	Ballina 375mm main	79,180	99,344	78,054	75,638		
	Lennox Head 200mm main	1,684	2,932	1,794	2,136		
	Basalt Crt 450mm main	135,680	113,217	140,645	131,857		
	Ballina Heights	5,218	5,292	7,139	6,362		
	Sub-Total	221,762	220,785	227,632	215,993		
	Wollongbar 375mm main	55,062	55,690	60,794	61,640		
	Lumley Park Bore	0	0	0	0		
	Converys Lane Bore	0	0	0	0		
	Sub-Total	55,062	55,690	60,794	61,640		
	TOTAL	276,824	276,475	288,426	277,633	↑ 0.42	37.69
TOTAL MONTHLY CONSUMPTION BY CONSTITUENT COUNCILS		779,925	790,200	763,937	736,560	↓ 6.79	100.00

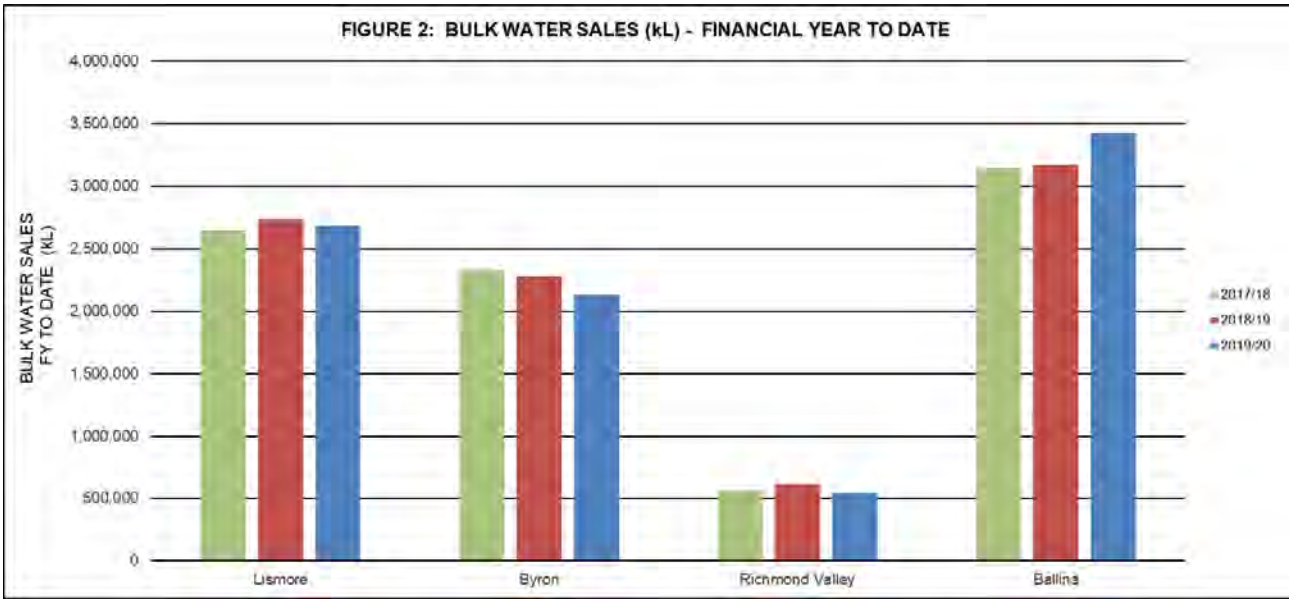
Monthly consumption by constituents

Figure 1 is the monthly consumption for each council area compared to the previous two years.



Sales to constituents – financial year to date

Figure 2 is the bulk water sales in kilolitres to the constituent councils for the financial year to date compared to previous financial years.



Source contribution

The table below is the source contributions in kilolitres for the month compared to the corresponding month of the previous two years.

Daily source usage for April 2020 averaged 25.827ML. This is a decrease from the March 2020 daily average of 26.021ML. Rocky Creek Dam as of 30 April 2020 was at 98.20% of full capacity.

Source	April 2018	April 2019	March 2020	April 2020	Change on previous year %	% of Total
Rocky Creek Dam	867,363	747,454	800,376	764,891		98.72
Wilson River	8,032	0	0	0		0.00
Emigrant Creek Dam	761	132,806	6,285	9,905		1.28
Alstonville Plateau Bores	0	0	0	0		
Coastal Sands Bores	0	0	0	0		
MONTHLY TOTAL	876,156	880,260	806,661	774,796	↓ 11.98	100.00
CALENDAR YEAR TO DATE TOTAL	3,783,795	4,271,988	2,536,622	3,311,418	↓ 22.49	

New connections

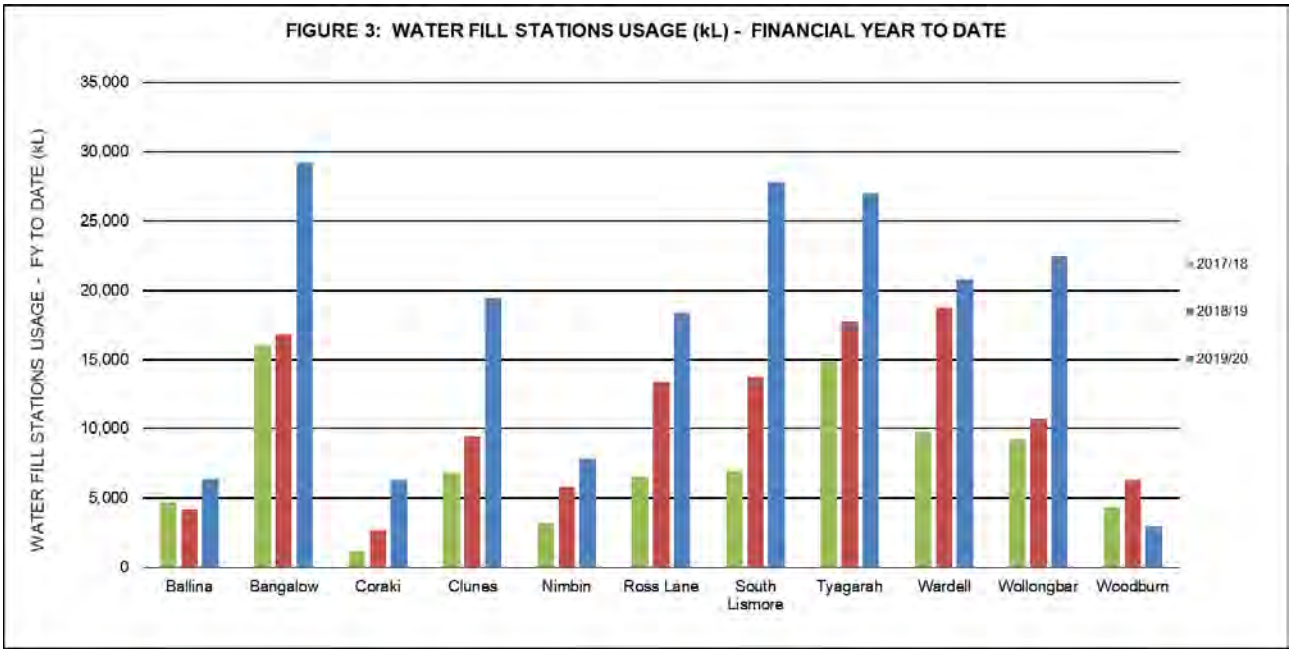
The table below is a summary of the new water connections for each council for the month. The kL/connection/day provides a comparison of the monthly consumption per connection per day.

Supply authority	New connections for month	Calendar year to date total	Total connections	kL/Connection/Day
Lismore City Council	8	28	14,050	0.58
Byron Shire Council	3	104	10,211	0.56
Richmond Valley Council	N/A	2	2,710	0.53
Ballina Shire Council	42	69	15,449	0.60
Rous County Council	1	4	2,126	0.94
TOTAL	54	207	44,546	

Water fill stations

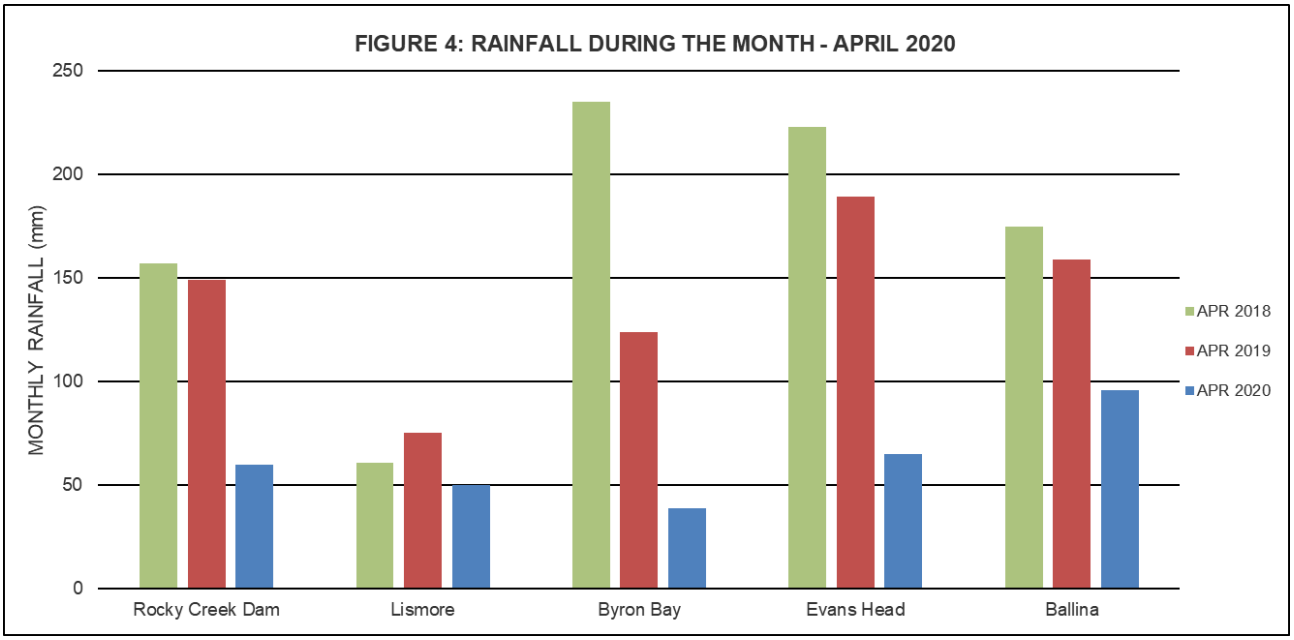
Figure 3 is the usage from the public water fill stations for the financial year to date in kilolitres for each water fill station compared to previous financial years.

Total water usage for the public water fill station network for April 2020 was 5,116kL, an increase from 2,798kL in March 2020.



Rainfall by area

Figure 4 is the monthly rainfall for Rocky Creek Dam and council areas compared to the previous two years.



Note: The Rocky Creek Dam rainfall reading is from the rain gauge at Nightcap Water Treatment Plant. Other rainfall data is from the Bureau of Meteorology.

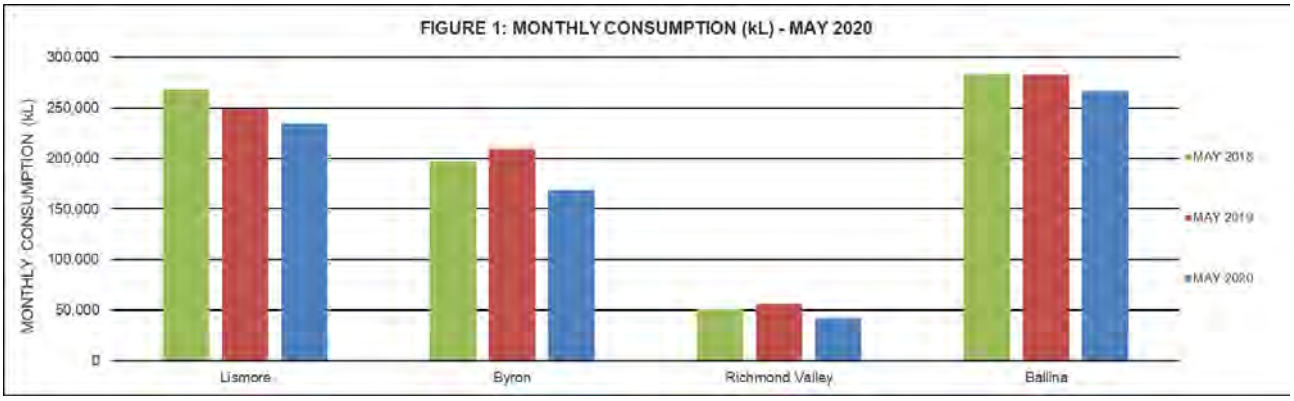
- **Summary for May 2020**

The table below is the May 2020 bulk water sales to the constituent councils in kilolitres compared to April 2020 and the corresponding May for 2018 and 2019.

Council	Council area	May 2018	May 2019	Apr 2020	May 2020	Change on previous year %	% of Total
Lismore City Council	Dunoon/The Channon	12,541	12,033	13,668	11,902		
	Clunes	5,130	3,524	3,987	4,167		
	Pineapple Road	682	375	471	397		
	Holland Street	37,512	36,521	36,140	34,998		
	Ross Street	73,805	69,546	73,006	68,313		
	Tullera	1,517	1,025	1,544	1,461		
	No. 4 Reservoir	37,468	45,474	36,684	33,680		
	No. 9 Reservoir	94,193	75,984	72,544	74,871		
	Tanelawn	4,660	4,164	4,677	4,294		
	North Woodburn	825	609	803	783		
	TOTAL	268,333	249,255	243,524	234,866	↓ 5.77	32.96
Byron Shire Council	Bangalow	17,468	13,226	13,930	15,008		
	Byron Bay	44,424	44,787	28,560	26,840		
	Coopers Shoot	72,535	78,766	63,753	65,835		
	Wategos Beach	4,311	3,673	6,998	3,646		
	Brunswick Heads	14,177	15,140	13,148	12,423		
	Ocean Shores	44,878	53,998	45,571	44,981		
	TOTAL	197,793	209,590	171,960	168,733	↓ 19.49	23.68
Richmond Valley Council	Coraki	10,174	10,317	9,337	9,843		
	Woodburn	4,265	4,647	4,351	3,856		
	Broadwater	12,311	13,750	6,729	6,062		
	Evans Head	24,262	27,534	23,026	22,730		
	TOTAL	51,012	56,248	43,443	42,491	↓ 24.46	5.96
Ballina Shire Council	Ballina 375mm main	61,955	102,804	75,638	77,853		
	Lennox Head 200mm main	1,758	3,126	2,136	13,294		
	Basalt Crt 450mm main	156,089	111,796	131,857	107,641		
	Ballina Heights	5,478	6,655	6,362	6,791		
	Sub-Total	225,280	224,381	215,993	205,579		
	Wollongbar 375mm main	58,352	58,343	61,640	60,852		
	Lumley Park Bore	0	0	0	0		
	Converys Lane Bore	0	0	0	0		
	Sub-Total	58,352	58,343	61,640	60,852		
	TOTAL	283,632	282,724	277,633	266,431	↓ 5.76	37.39
TOTAL MONTHLY CONSUMPTION BY CONSTITUENT COUNCILS		800,770	797,817	736,560	712,521	↓ 10.69	100.00

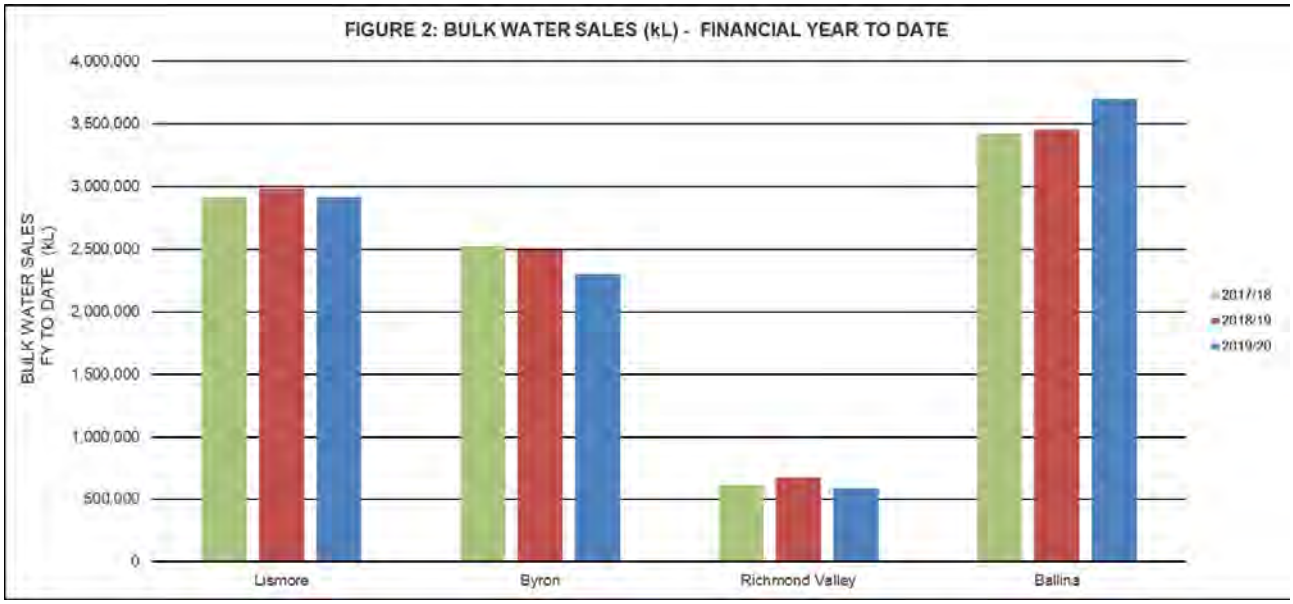
Monthly consumption by constituents

Figure 1 is the monthly consumption for each council area compared to the previous two years.



Sales to constituents – financial year to date

Figure 2 is the bulk water sales in kilolitres to the constituent councils for the financial year to date compared to previous financial years.



Source contribution

The table below are the source contributions in kilolitres for the month compared to the corresponding month of the previous two years.

Daily source usage for May 2020 averaged 23.976ML. This is a decrease from the April 2020 daily average of 25.827ML. Rocky Creek Dam as of 31 May 2020 was at 96.85% of full capacity.

Source	May 2018	May 2019	Apr 2020	May 2020	Change on previous year %	% of Total
Rocky Creek Dam	905,501	843,910	764,891	714,201		96.06
Wilson River	10,147	0	0	0		0.00
Emigrant Creek Dam	0	48,770	9,905	29,053		3.91
Alstonville Plateau Bores	0	0	0	0		
Coastal Sands Bores	0	0	0	0		
MONTHLY TOTAL	915,648	892,680	774,796	743,254	↓ 16.74	100.00
CALENDAR YEAR TO DATE TOTAL	4,699,443	5,164,668	3,311,418	4,054,672	↓ 21.49	

New connections

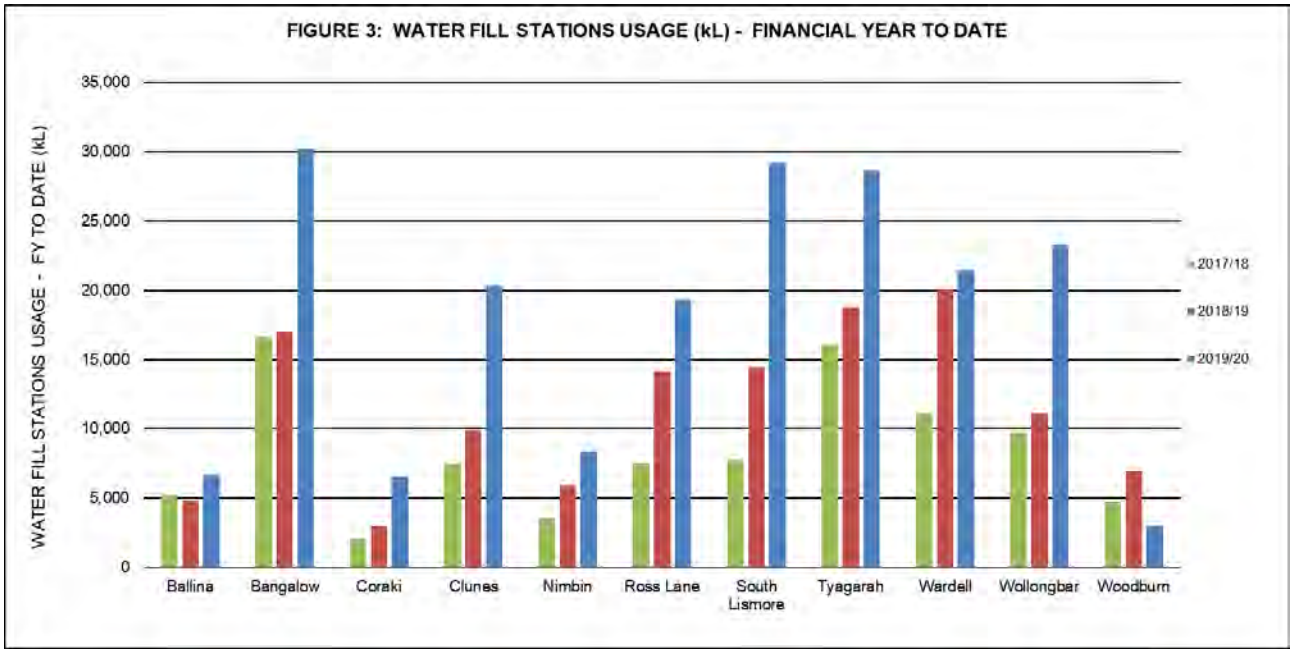
The table below is a summary of the new water connections for each council for the month. The kL/connection/day provides a comparison of the monthly consumption per connection per day.

Supply authority	New connections for month	Calendar year to date total	Total connections	kL/Connection/Day
Lismore City Council	15	43	14,065	0.54
Byron Shire Council	11	115	10,222	0.53
Richmond Valley Council	12	14	2,722	0.50
Ballina Shire Council	N/A	90	15,470	0.56
Rous County Council	0	4	2,126	0.91
TOTAL	38	266	44,605	

Water fill stations

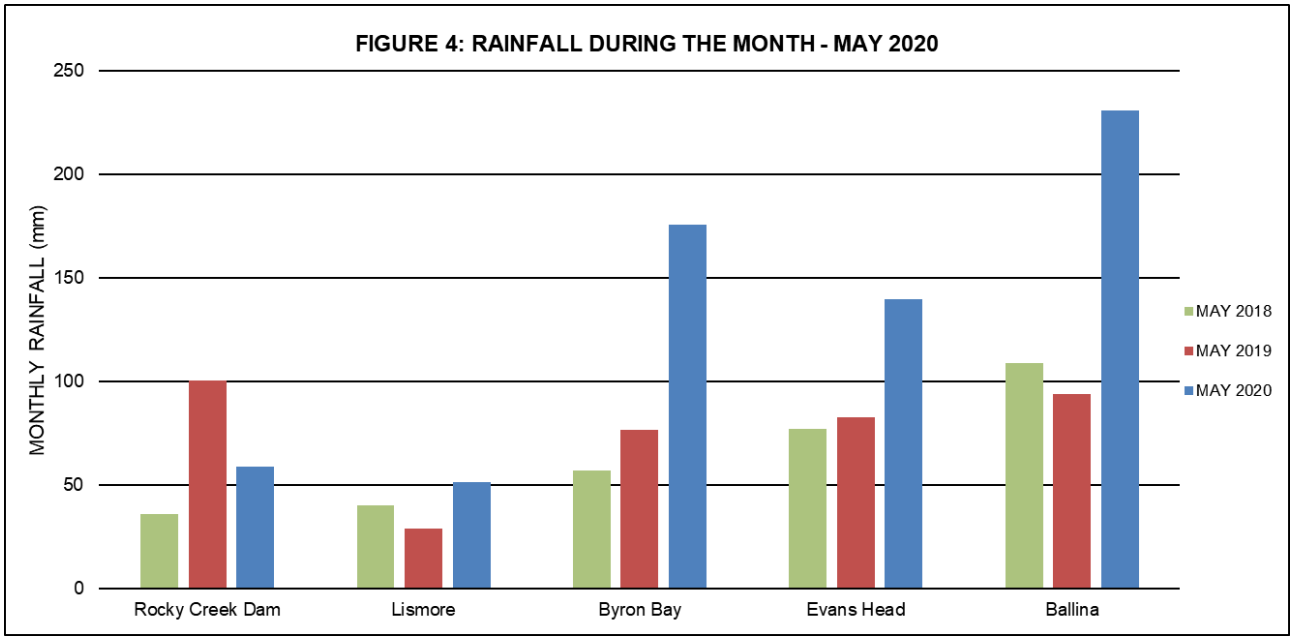
Figure 3 is the usage from the public water fill stations for the financial year to date in kilolitres for each water fill station compared to previous financial years.

Total water usage for the public water fill station network for May 2020 was 3,523kL a decrease from 5,116kL in April 2020.



Rainfall by area

Figure 4 is the monthly rainfall for Rocky Creek Dam and council areas compared to the previous two years.

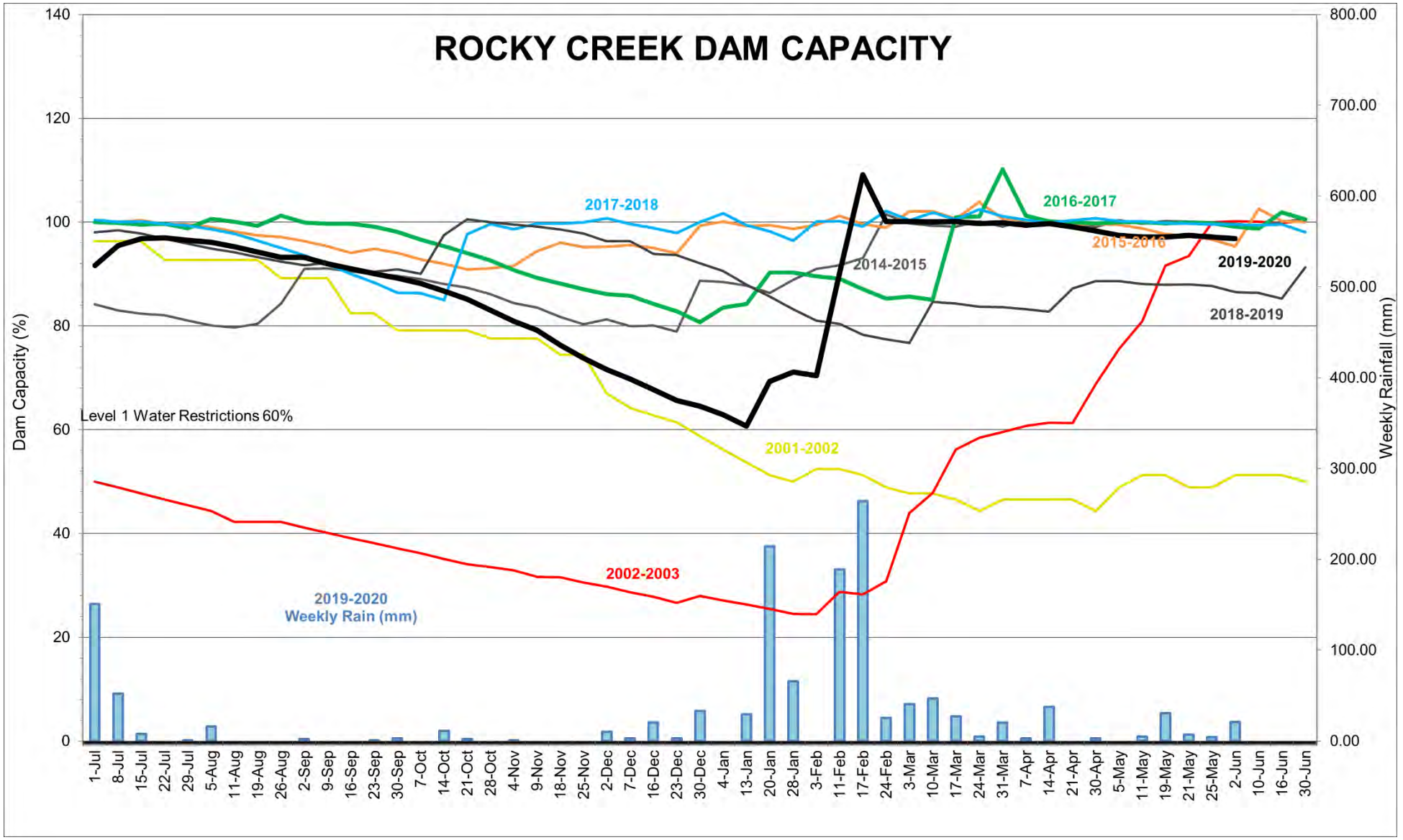


Note: The Rocky Creek Dam rainfall reading is from the rain gauge at Nightcap Water Treatment Plant. Other rainfall data is from the Bureau of Meteorology.

Andrew Logan
Planning Manager

Attachment: Rocky Creek Dam Capacity.

Attachment


ROCKY CREEK DAM CAPACITY
Dam Capacity (%)
Weekly Rainfall (mm)
Level 1 Water Restrictions 60%
2017-2018
2016-2017
2015-2016
2014-2015
2019-2020
2018-2019
2001-2002
2002-2003
2019-2020
Weekly Rain (mm)
140
120
100
80
60
40
20
0
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
1-Jul
8-Jul
15-Jul
22-Jul
29-Jul
5-Aug
11-Aug
19-Aug
26-Aug
2-Sep
9-Sep
16-Sep
23-Sep
30-Sep
7-Oct
14-Oct
21-Oct
28-Oct
4-Nov
9-Nov
18-Nov
25-Nov
2-Dec
7-Dec
16-Dec
23-Dec
30-Dec
4-Jan
13-Jan
20-Jan
28-Jan
3-Feb
11-Feb
17-Feb
24-Feb
3-Mar
10-Mar
17-Mar
24-Mar
31-Mar
7-Apr
14-Apr
21-Apr
30-Apr
5-May
11-May
19-May
21-May
25-May
2-Jun
10-Jun
16-Jun
30-Jun

Audit, Risk and Improvement Committee – meeting update

(847)

Business activity priority	Strategy and planning
Goal 2	Align strategic direction to core functions and sustainability

Recommendation

That Council receive and note the attached minutes from the Audit, Risk and Improvement Committee meeting of 25 May 2020.

Background

The Audit, Risk and Improvement Committee met on 25 May 2020 with members and invitees participating either in person at the Molesworth Street Administration building or online. A copy of the meeting minutes are attached (1 Attachment).

Key messages

1. COVID-19 planning and response

The Committee was provided with a summary report outlining the planning and response measures taken in relation to COVID-19 which are being led and coordinated by Council's Emergency Management Team. Measures include:

- Scenario mapping and risk assessment development
- Effecting working from home arrangements
- Work team and staff segregation
- Movement / site visitation restrictions
- Social distancing and enhanced hygiene measures
- Developing and implementing protocols for suspected infection and close contact
- 'Opting in' to the *Local Government (COVID-19) Splinter (Interim) Award 2020* as a precautionary measure.

The Emergency Management Team remains in place with members rotated after 3 weeks, in order to manage fatigue. Team member rotation is an important measure as the participants are also undertaking their substantive roles in addition to their Emergency Management team duties.

2. Update on various financial matters reported to Council's April 2020 meeting

An update on and copies of the reports in relation to the following matters reported to Council's April 2020 meeting were furnished to the Committee:

- Draft Delivery program | Operational plan (including Revenue Policy, 2020/21 budget estimates) (to be publicly exhibited)
- Quarterly budget review statement for the quarter ending 31 March 2020
- Investment report – March 2020
- 'Debt management and financial hardship' policy – proposed (to be publicly exhibited)
- 'Investment' policy – review.

Committee members expressed their appreciation for the regular provision of this information, noting that the information was important for the performance of their role on the Committee.

It was noted that a letter of support was provided by Richmond Valley Council in relation to the draft Delivery program | Operational plan and budget, but otherwise no public submissions had been received in relation to that document. The Committee was also advised that no public submissions were received in relation to the proposed 'Debt management and financial hardship' policy.

3. Internal audit

Final report and management responses for Asset Management review completed

The final audit report including management responses was reported to the Committee. The audit was undertaken in November 2019.

Objective

To assess the adequacy and effectiveness of Council's internal controls and processes to ensure water supply infrastructure and flood mitigation assets:

- Are renewed and upgraded following a transparent, accountable and evidence-based system
- Maintenance is undertaken in a cost effective manner but also to enhance useful life of assets
- Meet the needs of the community
- Budgets are in place and monitored to reduce risk of over expenditure.

The review covered the period 1 July 2018 to time of the review and did not include buildings or plant / equipment. Council Depots, Perradenya Estate and Dams were excluded.

Scope

Internal controls and processes related to the following key elements:

- Water Treatment and Distribution Infrastructure / Flood Mitigation Assets management strategies, policy and procedures
- Asset Planning including demand forecasting, strategic planning and investigation and design
- Asset Creation/Acquisition
- Asset Disposal
- Environmental Assessment/Consideration
- Asset Operations
- Asset Maintenance
- Asset Information Systems (Confirm & GIS)
- Risk Management
- Contingency Planning
- Long-Term Financial Planning
- Capital Expenditure Planning aligned to strategic objectives
- Review of Asset Management Systems and Improvement Planning.

Result

The review identified that the following controls were already in place and effective:

Control	Description
Project Management Framework	The development of the PMF has formalised some key considerations at critical stages of a project and improved the accountability, transparency and tracking of project work by management.
Confirm Connect	The mobility system has enabled flood mitigation operations staff an integrated solution to provide live updates to the asset register and work order modules. This more efficient process ensures a lower risk of data loss and greater monitoring capabilities for management.
Asset Management Plan (AMP)	The AMP is relatively comprehensive and contains key elements such as risk management, demand forecasting, levels of service and financial planning.
Capital Works Program	While it was found that the inputs into the capital works program require further refinement, RCC has developed the Capital Works Planning Process and Inputs, which provides an effective tool to capture upcoming capital works. The plan takes inputs from various sources to allow for a long term forecast to be developed.
Budget Creation/Monitoring	The formation of yearly budgets is controlled and compiled by the Finance team and contains robust controls in the calculation and analysis of budget submissions as well as strong lines of communication between the AM and Finance team.
Risk Management	Activities to identify risks were being performed on an ongoing basis with specific risks being recorded within a variety of detailed risk registers. While detailed risks were found, slight further development is required to ensure that treatment plans are recorded for each.
Service Level Agreements (SLAs)	Strong service level agreements were found to have been established with all four of the constituent Councils. The SLAs consider key areas such as quantities, quality and notification requirements. These allow for the needs of the constituent Councils to be captured and a formal mechanism to measure how these are being effectively met.

An overview of the key findings and areas for improvement were identified as follows:

#	Finding	Summary	Rating
1	Asset Register/GIS Data Issues	Incomplete and out of date key data in both Confirm's Asset Register and Councils GIS	High
2	Asset Creation Process	Lack of evidence based decision making and procedural guidelines at scoping stage. Also an underutilisation of the project management framework (PMF) when assets are created.	Moderate
3	Asset Handover Process	An underutilisation of appropriate asset creation, disposal and project closure forms leading to a lack of communication on relevant asset changes. PMF is lacking an asset handover stage to prompt and formalise the preparation of such documents.	Moderate
4	Lack of Planned Maintenance Program/Lack of Accurate Cost Capture	Lack of maintenance information within Confirm leading to an inability to generate comprehensive planned maintenance programs. Lack of accurate and precise maintenance cost capture within Confirm and NAV leading to inability to accurately analyse maintenance spend.	Moderate
5	AM Documentation Development	No AM or maintenance strategies within AM system. Some other key procedural documents have also not been developed.	Low

Management responses prepared in relation to the review report addressed each finding and included specific corrective / improvement actions to be taken by staff.

Progress against completion of those will be monitored by Grant Thornton and formally reported to the Audit, Risk and Improvement Committee.

4. Service reviews – 12month customer service trial update

In parallel with progress of the Electronic Document Records Management System (EDRMS) project and customer relationship management (CRM) system project, changes in the structure and function of the customer service / reception area are being trialled. The timing of the trial is aimed at testing workflows (inwards and outwards) and operating arrangements for the purpose of informing the other projects underway (EDRMS and CRM) as well as identifying changes required to optimise business process efficiency and customer experience. The trial will conclude in February 2021.

Consultation

This report was prepared in consultation with the Audit, Risk and Improvement Committee Chairperson.

Conclusion

This report provides a summary of the key messages from Council's Audit, Risk and Improvement Committee meeting of 25 May 2020. A copy of the minutes from the meeting are attached for information.

Phillip Rudd
General Manager

Attachment

1. Minutes from Audit, Risk and Improvement Committee meeting of 25 May 2020

Attachment 1

Rous County Council

Audit, Risk and Improvement Committee Minutes

Monday, 25 May 2020

The Chair opened the meeting at 10.00am.

In attendance:

Voting Committee:

- Brian Wilkinson (Independent member - Chair) – via Zoom link
- David Yarnall (Independent member) – at admin. office
- Cr Darlene Cook (Council member) – via Zoom link

Rous County Council:

- Phillip Rudd (General Manager) – via Zoom link
- Helen McNeil (Group Manager People and Performance) – via Zoom link
- Guy Bezrouchko (Group Manager Corporate and Commercial) – via Zoom link
- Andrew Logan (Planning Manager) – via Zoom link
- Geoff Dwyer, TNR – via Zoom link
- Phil Courtney (Group Manager Operations) – via Zoom link

1. APOLOGIES

Jodie Carte, Thomas Noble & Russell.

2. ACKNOWLEDGEMENT OF COUNTRY

Council showed its respect and acknowledged the Traditional Custodians of the Land, of all Elders, on which this meeting took place.

3. MINUTES OF PREVIOUS MEETING

Minutes of the meeting held 25 March 2020 were noted as presented.

4. DISCLOSURE OF INTEREST

Nil.

5. STANDARD REPORTS

Phil Rudd joined the meeting 10.05am.

i). Risk Management

- **Enterprise risk management**
- **Work Health and Safety (WHS)**

RECOMMENDATION (Wilkinson/Cook) that the Audit, Risk and Improvement Committee receive and note the information presented in the report regarding enterprise risk management and progress against completion of actions rated 'high' or above in Council's risk register.

CARRIED

ii). Governance

RECOMMENDATION (Yarnall/Cook) that the Audit, Risk and Improvement Committee receive and note the information presented in this report regarding progress against actions arising from internal audits.

CARRIED

6. GENERAL MANAGER REPORTS

i). Performance and performance improvement

RECOMMENDATION (Wilkinson/Yarnall) that the Audit, Risk and Improvement Committee receive and note the report.

CARRIED

7. GROUP MANAGER CORPORATE AND COMMERCIAL REPORTS

i). Financial management

- **Draft Delivery program / Operational plan / 2020/21 Budget**
- **Quarterly Budget Review Statement for quarter ending 31 March 2020**
- **Investment report – March 2020**
- **'Debt management and financial hardship' policy**
- **'Investment' policy (reviewed)**

RECOMMENDATION (Wilkinson/Yarnall) that the Audit, Risk and Improvement Committee receive and note the information presented in the Financial management report – May 2020 regarding:

1. The Draft Delivery program / Operational plan and 2020/21 Budget furnished to Council's April 2020 meeting applicable for 1 July 2020 to 30 June 2021.
2. Audit Office of NSW Management letter issues, summary of actions.
3. The quarterly budget review report furnished to Council's April 2020 meeting applicable for the quarter ending 31 March 2020.
4. The investment report furnished to Council's April 2020 meeting applicable for the month of 31 March 2020.
5. The Debt Management and Financial Hardship policy furnished to Council's April 2020 meeting.
6. The Investment policy (reviewed) furnished to Council's April 2020 meeting.
7. Data breach incident.

CARRIED

ii). Service reviews

RECOMMENDATION (Yarnall/Cook) that the Audit, Risk and Improvement Committee receive and note this report regarding the Customer Service Review and trial Customer Service Team.

CARRIED

8. GROUP MANAGER PEOPLE AND PERFORMANCE

i). Other matters

RECOMMENDATION (Wilkinson/Cook) that the Audit, Risk and Improvement Committee receive and note the report.

CARRIED

9. CONFIRMATION OF MINUTES

i). Audit, Risk and Improvement Committee meeting minutes 25 May 2020

RECOMMENDATION (Yarnall/Wilkinson) that the minutes of the Audit, Risk and Improvement Committee meeting held 25 May 2020 be confirmed.

CARRIED

10. NEXT MEETING

Monday, 27 July 2020.

11. CLOSE OF BUSINESS

There being no further business the meeting closed at 11.12am

Reports / actions pending

(1181/12)

Business activity priority	Process management, improvement and innovation
Goal 6	Continuous improvement through process management and innovative thinking

Background

Following is a list of pending resolutions with individual comments provided on current position and expected completion date.

Meeting	Resolution	Status
20/02/19	***Confidential report:*** **Development Servicing Plan for Bulk Water Supply 2016 – request for deferred payment arrangement**	
	RESOLVED [13/19] (Mustow/Cadwallader) that Council: 1. Receive and note this report; 2. Approve the request for deferred payment arrangements as set out in the report; 3. Receive a subsequent report on policy options for deferred payment arrangements having regard to the Development Servicing Plan for Bulk Water Supply and the policy positions of the constituent councils; and 4. Reject any further consideration of similar requests until point 3. is complete and a policy position is determined.	Scheduled for review before the expiry of the current Development Servicing Plan in 2021.
21/08/19	**Delivery program progress update: 1 January to 30 June 2019**	
	RESOLVED [55/19] (Cameron/Ekins) that Council: 1. Receive and note the report and attachment. 2. Acknowledge that sound and effective governance requires that staff and councillors are able to participate fully in work tasks and decision making and that equitable access measures for all are essential for this and that consequently all Delivery Plan Actions be reviewed to determine that equitable access measures reflect this principle. 3. In relation to Action 2.4.3.1, that customers, staff and councillors with a disability be invited to discuss their perspectives in the development of access awareness training.	COMPLETE (3 and 4). General Manager emailed Councillors 27/09/19 regarding Disability Awareness training, seeking feedback by 31/10/2019. The trialled training package has been rolled out to staff for completion. The release of the training coincided with the 'International Day of People with a Disability', which was on 3 December 2019.

Meeting	Resolution	Status
	4. In relation to Action 2.4.3.2, customers, staff and councillors with a disability be invited to participate in the access training provided to staff. 5. In relation to Actions 2.4.3.7/8, a review is initiated to determine the effectiveness of access measures and standards based on the feedback of staff, customers and councillors who use foyers 2 and 4.	
11/12/19	**Information reports**	
	A future report be provided to Council on Perradenya cycleway.	IN PROGRESS. Response from Lismore City Council has been received and is currently being considered. Workshop scheduled for September 2020.
	Richmond River Cane Growers' Association submission: *Review of Tuckombil Canal fixed weir (Letters 118585 / 53238)*	Report to Council December 2020.

Phillip Rudd
General Manager