RMCG

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Recycled Water Strategy

Fraser Coast REGIONAL COUNCIL

Building better communities together.

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Foreword

Fraser Coast Regional Council and its predecessor organisations have been successfully recycling treated sewage for many decades. The beneficial end uses, irrigated hardwood plantations and agricultural crops, add to the economic product of the region and the environmental benefits from reduced nutrient discharges to the natural environment, are features of Council's past commitment to wastewater recycling.

This report sets in place a Recycled Water Strategy, a first for Fraser Coast. The Strategy has been prepared through collaborative input from staff, technical consultants, an executive steering committee, customers and industry. Council has a strong legacy of recycling, but is now at a crossroads on many recycled water issues, and this Strategy provides direction on critical high-level decisions needing to be made over the next few years, such as:

- Urban growth will generate more volumes of wastewater – should that extra wastewater be discharged to the natural environment under environmental licences, or should it be directed to controlled irrigation on land?
- Urban growth may displace some areas of land currently dedicated to agriculture and forestry irrigated by recycled water – how can Council smoothly adapt and transition these land use changes into the future?
- Council has developed significant expertise in hardwood plantation forestry – what role should existing and new plantations play in the future?
- The nature of farming and agriculture changes continually – could industry trends threaten the livelihoods of some of the recycled water customers and how can this risk be mitigated? Are there emerging agricultural industries that could productively reuse the treated wastewater?
- Supply of drinking water is going to be a challenge for the region – what role can recycled water play in meeting future drinking water needs, either by substitution (meeting other demands) or as a new raw water stream (indirect potable reuse)?
- Recycled water schemes cost money to operate – how should those costs be most equitably recovered?
- Recycled water sharing – recycled water for irrigation is not as reliable as it seems. During wet times there is plenty of recycled water but very little irrigation demand. During dry times, all recycled water customers are likely to want extra water for irrigation, but sometimes there is not enough to go around. How should the recycled water be shared and allocated?

While the Recycled Water Strategy cannot answer all these questions, it does provide an adaptive framework which will allow Council and officers to confidently plan, investigate and act over the next five years towards their longer-term resolution.

The strategy has a 30 Year timeframe, but we will periodically review it every five years to ensure it remains relevant and to account for shifting technology, land development patterns and community expectations.

I commend this Strategy to all and thank those involved in its preparation.

For further information, Council has established a dedicated project page on our Engagement Hub website[1].

Cr George Seymour

Mayor

February 2023

[1] https://frasercoast.engagementhub.com.au/recycled-water-strategy

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1 Introduction

1.1 THE NEED FOR A STRATEGY

Fraser Coast Regional Council is a national leader in ensuring our precious water does not go to waste. Our recycled water schemes, some of which have been in place for more than 25 years, routinely use 90 to 100 per cent of the Fraser Coast's treated wastewater for golf courses, turf farms, sporting fields and sugar cane crops. Council also grows 500,000 native trees on the outskirts of Hervey Bay to help reuse the region's wastewater.

A Recycled Water Strategy is needed because, with population rising, volumes of treated wastewater will increase, and this additional water is available for reuse.

While the Strategy cannot determine future management solutions, it provides an adaptive framework which will allow Council and officers to plan, investigate and act with confidence over the next few years.

1.2 RECYCLED WATER

1.2.1 SEWAGE WASTE GENERATION

This Strategy addresses the treated sewage waste stream which is generated every day from the eight sewage treatment plants (Figure 1-1) operated by Council. To put this in context we must look upstream to see where the sewage comes from. In summary:

- Residential houses, commercial shops and businesses all generate sewage from toilets, kitchens and bathrooms.
- In rural areas, and in quite a few rural residential neighbourhoods in the Fraser Coast area, householders manage their domestic sewage on site through on-site treatment systems with on-site irrigation or septic tanks with onsite disposal of the partially treated wastewater in effluent transpiration beds. These households are not connected to sewer and management of their effluent is not addressed in this Strategy.
- In most urban neighbourhoods, however, Council provides reticulated sewerage services and operates networks of gravity sewers and sewage pumping stations. This infrastructure collects the domestic and commercial sewage and conveys it to central locations for treatment. Figure 1-1 illustrates the sources of recycled water in the Fraser Coast.
- Sewage treatment plants continually process the collected sewage to reduce the harmful organisms, reduce organic matter and nutrients and make the treated wastewater suitable for end uses such as disposal to the natural environment and recycled water irrigation. A summary of the current users in the Hervey Bay Sewage Treatment and recycled water scheme is provided in Appendix B. This strategy focuses on the management of recycled water but does not consider the management of biosolids, which are a nutrient and organic rich by-product of the sewage treatment process.
- Sewage (and hence recycled water) is generated every day. In wet weather the flows can be higher than average due to stormwater inflow to the sewers. Recycled water demands, however, have a different climatic pattern, so sometimes treated recycled water must be stored in large storages so it can be carried forward from wet times to meet irrigation demands during dryer times.
- Discharge to the environment is sometimes unavoidable, and permit conditions[2] allow Council to discharge treated water to some waterways under strict rules regarding the quality of water and the timing of the release.

In simple terms, properties connected to sewer generate sewage continuously, which is treated in the sewage treatment plants. This treated water is managed under recycled water schemes that recycle almost all the

[2] Council's Environmental Authority EPPR00815913, can be viewed at: https://apps.des.qld.gov.au/public-register/pages/ea.php?id=109904

treated water generated during dry weather, and discharge to the natural environment the wet weather surcharges.

Figure 1-1: Sources of recycled water (8 sewage treatment plants)

1.2.2 FRASER COAST RECYCLED WATER NETWORK

Treated wastewater can be discharged to the natural environment or beneficially reused for agriculture, industry and/or amenity purposes. Given the functionality of the current scheme, demographics of the area and regulatory requirements, Fraser Coast Regional Council is currently focused on beneficial reuse for irrigation primarily of agriculture and forestry.

The recycled water network infrastructure servicing the Fraser Coast Region consists of pumps, storages and pipelines which convey water from the sewage treatment plants to irrigation systems on Council owned land and irrigation systems on private land. Landholders invest in on-farm irrigation infrastructure to deliver water to crops. The irrigation systems and the crops grown, and the underlying soils in which the crops grow, and the water is held, are all part of the recycled water network.

As well as the physical infrastructure assets, the recycled water system also comprises policies, management procedures, regulatory compliance, supply agreements, reporting, monitoring, record keeping, billing and other management and administrative systems.

1.3 STRATEGY DEVELOPMENT

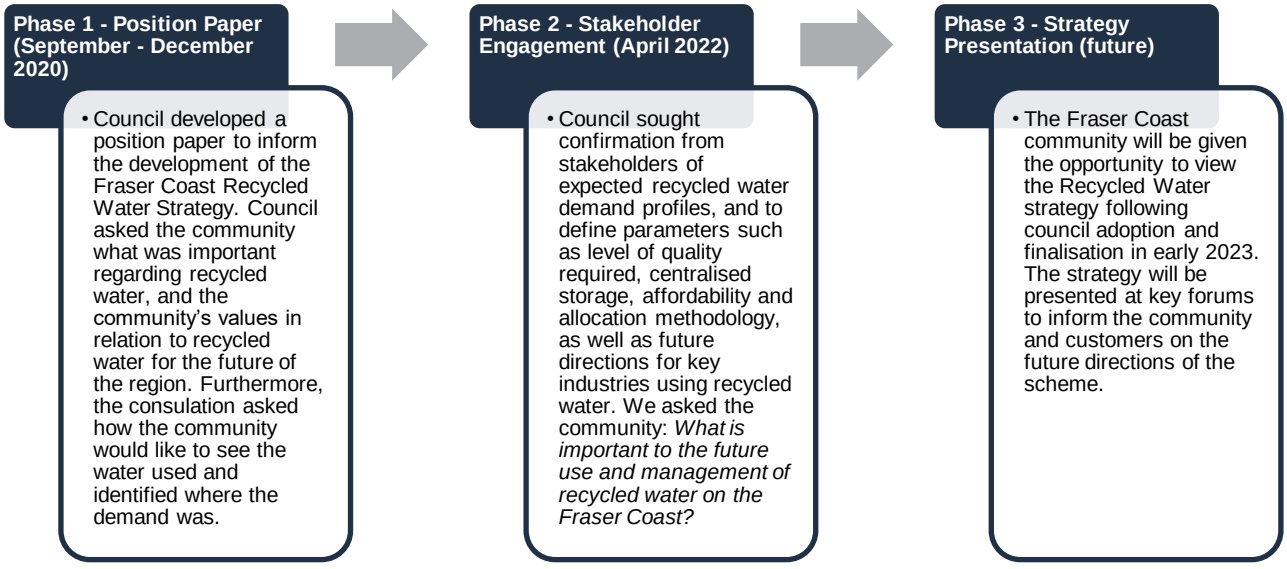
1.3.1 THEMES AND STRATEGIC OBJECTIVES

Themes and Strategic Objectives for the Recycled Water Strategy were developed with the Wide Bay Water and Waste Advisory Committee3 to receive guidance from a governance, social and technical perspective.

The purpose of the Themes and Strategic Objectives helped to ensure community values and strategic business considerations were identified early in the process to shape the strategy outcomes, rather than outcomes being determined from a purely technical approach.

1.3.2 STAKEHOLDER ENGAGEMENT

The project included three engagement phases:



[3] https://www.frasercoast.qld.gov.au/water-advisory-committee

1.3.3 STRATEGY IMPLEMENTATION

This Recycled Water Strategy has been developed with a 30-year timeframe. The strategy aims to guide the development of recycled water scheme expansions and ensure the efficient use of this resource to meet community, social and environmental outcomes. It also intends to guide the most cost-effective investment in infrastructure for the Fraser Coast Regional Council.

As previously highlighted, the strategy was developed through extensive consultation and consolidation of comprehensive technical studies. In addition, considerable work was undertaken to underpin the Strategy objectives including:

- Consultation with end users to understand their current and future needs
- Development and design of options for future recycled water scheme development
- A Triple Bottom Line assessment considering costs and benefits of different options.

The Strategy cannot determine future management solutions, rather it provides an adaptive framework which will allow Council and officers to plan, investigate and act with confidence over the next few years.

Fraser Coast Regional Council will undertake a review of the strategy at least every 5 years or as required to maintain its currency with market or legal requirements. These reviews will consider changes in the operating and policy context and how these impact on the proposed options. It is essential that the strategy allows adaptive management, to ensure that the Council responds to opportunities and challenges when they arise. The reviews will provide clarity on the investment priorities for that future period.

The Strategy will be supported by annual operating plans incorporating technical investment and infrastructure plans. The infrastructure investment plan will be supported by the 10-year capital investment programme.

1.3.4 SUPPORTING DOCUMENTS

The following reports and investigations were completed to inform this strategy (Table 1-1). Development of these documents included desktop analysis, internal workshops and community engagement levels of inform, consult, involve and collaborate.

Table 1-1: Key documents referenced in development of the Strategy

	STUDY	AUTHOR	DESCRIPTION
Governance	**FCRC Corporate Plan** 2018–2023	FCRC	FCRC commitment to: ▪ Maximise beneficial reuse of wastewater by-products ▪ Deliver Council's water and wastewater programs in accordance with environmental standards ▪ Identify and support a range of emerging and major events.
	Fraser Coast Recycled Water Strategy - Terms of Reference	FCRC	Implement Council Resolution (ORD 10.5.1) to provide an agreed statement of the background, objectives, and methodology associated with the development of the 2020 Fraser Coast Recycled Water Strategy.
	WBW Recycled Water Management Policy - Themes and Objectives	FCRC	Twelve (12) Strategic objectives were developed to assist in the overall direction of the FCRWS. The objectives were workshopped with the Wide Bay Water and Waste Services in February 2021 and subsequently endorsed in March 2021.
	Fraser Coast Recycled Water Strategy - Position Paper	Water Strategies	Position paper completed to develop an understanding of the current recycled water strategic landscape/knowledge gaps and to identify areas where Council input is required in formulating Council's policy on water recycling.
	Fraser Coast Recycled Water Strategy - Supporting Information	Water Strategies	Additional technical information supporting the Position Paper.
Community Engagement	**Recycled Water Strategy: Phase 1** - Values Engagement - Community Engagement and Evaluation Report	FCRC	Workshops and surveys on the Fraser Coast to understand the communities' values in relation to the question "What is important to the future use and management of recycled water on the Fraser coast?"
	Recycled Water Strategy: Phase 2 – Stakeholder Engagement – Customers and Industry Representatives	RMCG/ FCRC	Consultation to understand current levels of service and customer expectations, future industry directions and willingness to pay / affordability of recycled water.
Water Security/ Level of Service	**Fraser Coast Recycled Water Strategy** - Water Balance Model	KBR	Water balance and irrigation models (GOLDSIM/MEDLI) to inform future enabling infrastructure implications including the probability of dam overflow emergency plan triggers, when supply to customers reaches certain thresholds and end of pipe exceedances under the current Environmental Authority.
	Fraser Coast Water Supply Security Strategy - Planning Report	Cardno/ Stantec	Outcomes underpin the forward planning for the Region's water schemes including the updating of the Fraser Coast Water Supply Strategy, each scheme's Drought Management Plan and Council's Drought Management Implementation Plan.
	Recycled Water - Price and Tariff Options	RMCG	Explores how FCRC recycled water costs currently aligns with National Water Initiative pricing principles, including an assessment of the net revenue / cost position of water pricing. Reviews the current allocation framework and options for customer security.
	Hydraulic Effluent Water Model	FCRC/ Aecom	Effluent hydraulic model to provide a planning tool to assess network performance and to help optimise pumping and infrastructure performance. These models are based of the best available information and serve to aid decision processes for FCRC Effluent Strategy.

	STUDY	AUTHOR	DESCRIPTION
Forestry	**FCRC Irrigated Forest Estate** - Plantation Management Plan	Verterra	Guiding document based on criteria required by AS4708-2007 (Australian Standard for Sustainable Forest Management) and provides a forestry management approach to meet FCRC strategic forestry objectives.
	Irrigated Plantation Estate Model and Yield Projections (V4.0)	Verterra	Model provides strategic financial projections and silvicultural strategies. The model seeks to support market development and maximise ROI by determining the most appropriate silvicultural strategies, product delivery schedules and individual compartment productivity.
Triple Bottom Line Assessment and Options Selection	**Fraser Coast Recycled Water Strategy** - Options Selection	RMCG	Provides a summary of the TBL assessment and workshop process with a recommendation as to the preferred options to progress. The assessment is for Fraser Coast Regional Council consideration with the decisions on preferred options being a primary component of the Recycled Water Strategy.
	Triple Bottom Line (TBL) Economic Model - Cost-benefit analysis of future recycled water use in Fraser Coast	RMCG	Cost-benefit analysis using the Australian Recycled Water Centre of Excellence methodology to support options selection. Based on the economics of non-potable recycled water schemes using the concept of total economic value (TEV) including environmental and community costs and benefits.
	Concept Design Report – Cassava Pipeline Route Assessment and Preliminary Alignment Approvals **Planning Report** – Hervey Bay Reuse – Extension of Scheme to Vanderwolf Road **Howard Sewerage Scheme** – Planning Report **Desktop viability study** - Canegrowers Association proposal – Vanderwolf to Island Plantation **Desktop viability study** – Maryborough sports corridor **Toogoom Effluent Reuse Scheme** - Planning Report / Options Assessment	Various	Planning reports developed following the last Fraser Coast Sewerage Strategy in 2015. Desktop feasibility assessment of additional recycled water alignment proposals received during the community consultation phase including various cane farms between Hervey Bay and Island Plantations, and the Maryborough Golf Club / Maryborough Sports Grounds. Whilst not all these studies were developed during this strategic planning phase, they have been carefully considered in the final options selection process.

2 Recycled water issues

The key issues that the Recycled Water Strategy aims to address are outlined below (Table 2-1). A more detailed description of these issues is provided in Appendix A.

A summary schematic of the recycled water scheme is presented in Appendix B.

Table 2-1: Recycled water scheme issues

1. URBAN GROWTH
There is expected to be growth in the number of properties connected to sewer, especially in the Hervey Bay area. This will have a direct effect on the volume of sewage generated from households that needs to be treated and then disposed of or recycled. Town land use planning predicts that growth in Hervey Bay will take place along the southern part of town with this development partly overlapping current irrigated plantations and agriculture.
2. SEWAGE TREATMENT
The recycled schemes are presently Class B schemes, and the treatment plants are all capable of meeting or exceeding Class B. Council is currently undertaking a Sewerage Strategy which will look at future options and infrastructure requirements for collection of sewage in the longer term (due for completion in late 2022). In terms of geographical location for sewage treatment, this recycled water strategy assumes that the recycled water will continue to be available at the existing locations.
3. ENVIRONMENTAL DISCHARGE
Permit conditions regarding discharge to the environment are based on nutrient load and volume. These conditions are likely to become stricter in the future as Government policy focuses on protecting the coral reefs along the Queensland coast with effluent discharges one source of concern. Discharge options are necessary for high rainfall years when the ability to apply water to land in a sustainable way is reduced, but only within the permit limits for nutrient loads.
4. RECYCLED WATER BALANCE
A detailed water balance of the recycled water system has been developed. This model allows Council to manage recycled water through: ▪ Immediate use for irrigating pastures, crops, trees or turf ▪ Purpose built storages or third-party dams and/or ▪ Discharge to the environment.
5. WATER RELIABILITY
A regional water security plan was prepared in 2022. The plan considered the possibility of indirect potable reuse (IPR) to meet the drinking water needs of Hervey Bay in the future. This option was not preferred with challenges associated with the acceptance by the community and current users of recycled water, as well as practicality from an engineering perspective. Agricultural irrigators are concerned about the reliability of their recycled water supply because this can affect the profitability of their enterprise. Determining the priority of allocation and water sharing in dry periods is a complicated but necessary function that Council must fulfill. Storage can increase reliability of water for agricultural users. Given the rainfall variability, it is impractical to construct sufficient storage to avoid discharge to the environment.
6. WATER QUALITY AND PRICE
The recycled scheme quality is presently Class B. Class B is satisfactory for the vast volume of recycled water uses particularly for irrigated agriculture. Customers who require better quality (such as public open spaces, vegetable

crops and discharge to waterways) can install treatment systems (polishing) at the point of use for their own purposes to produce Class A or Class A+ recycled water.

Salinity can build over time and have impacts on crop health if not appropriately managed. Increasing salinity of the recycled water can arise from salt-water intrusion into the sewerage scheme.

Pricing of recycled water is not linked to the cost to producing it. Pricing needs to be based on a reasonable estimate of the cost of alternatives such as river and bore water for the agricultural commodities and the users' willingness to pay.

7. FUTURE TRENDS

Public Open Space: Urban irrigation using recycled water currently represents a small volume of recycled water. The use of recycled water can be of significant benefit to the users (public open space) particularly during dry periods. Unless there is restricted public access during and after irrigation with recycled water, treatment to Class A for this purpose is necessary using local polishing plants.

Agriculture: Class B water is suitable for a wide range of agricultural crops. Recycled water increases yields in crops making it attractive to farmers, especially in areas where there are no alternative water sources. Consultation with industry has highlighted that the demand for recycled water in the region is expected to increase particularly in the Maryborough Scheme. The agricultural future of the region is compatible with Class B, where soft fruits and vegetables are unlikely due to limited packaging and processing facilities. However, macadamias may become more prevalent. A diversity of crops will spread the climatic demand of water.

Plantation Forestry: Hardwood plantations play an important role in using the recycled water and in the long term will return some revenue.

The following visual representation illustrates the key issues of the Fraser Coast Recycled Water Scheme (Figure 2-1).

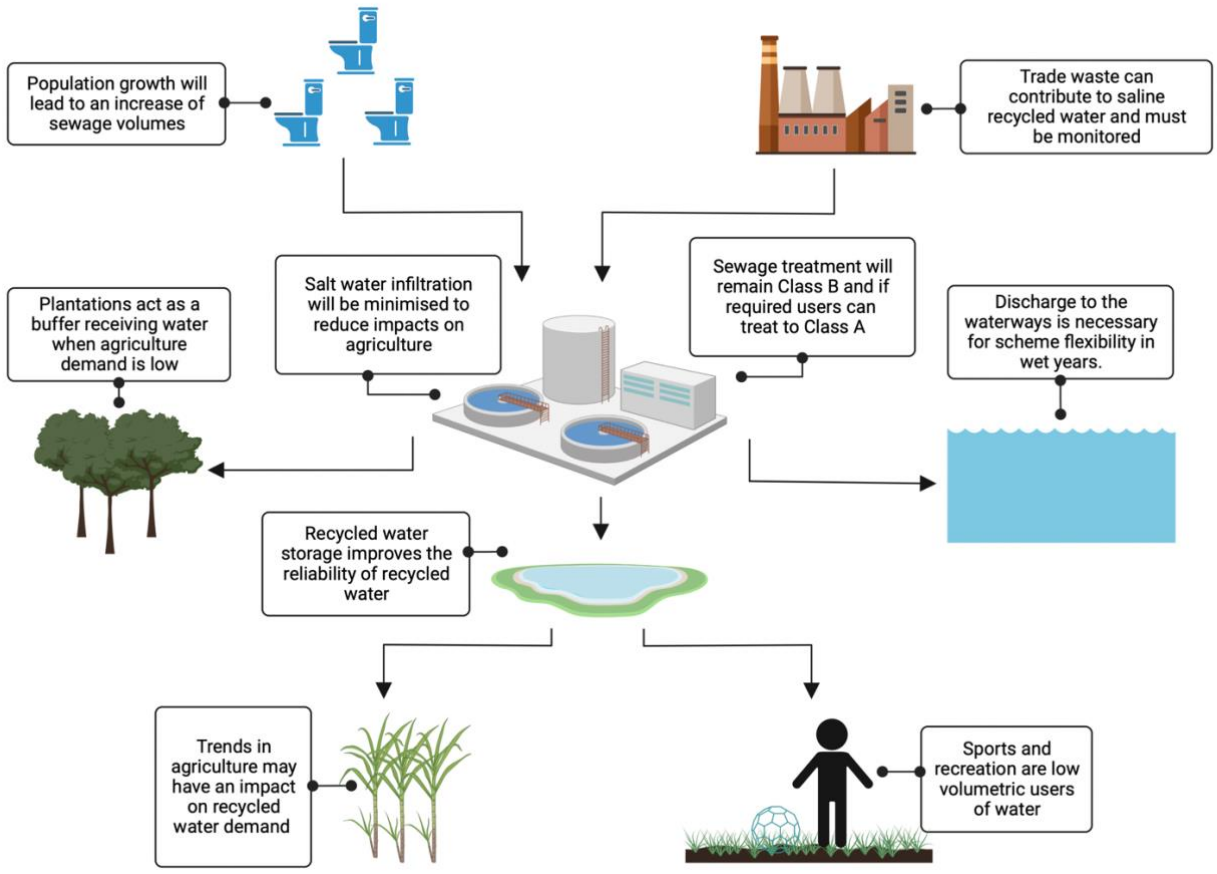


Figure 2-1: Recycled water scheme issues

3 Strategic vision

3.1 OUR VISION

Fraser Coast Regional Council manages Recycled Water to ensure the optimisation of TBL (environmental, social and economic) outcomes.

3.2 OBJECTIVES

The Themes and Strategic Objectives developed in conjunction with community stakeholders and the Wide Bay Water and Waste Advisory Committee are provided in Table 3-1, forming the structure of the action plan for this Strategy.

Table 3-1: Strategic Themes and Objectives for the Recycled Water Strategy

THEME 1: RECOGNISING AND OPTIMISING RECYCLED WATER AS A RESOURCE
Objective 1: Recycled Water is managed and planned in a way that recognises it is a valuable resource for the Fraser Coast community, within regulatory frameworks.
Objective 2: Recycled Water is beneficially utilised and discharge to the environment is minimised.
THEME 2: TRIPLE BOTTOM LINE SUSTAINABILITY
Objective 3: Recycled Water outcomes and performance are measured through a balanced view of cost and benefit through a Triple Bottom Line framework, taking into consideration community values.
THEME 3: CONTRIBUTION TO WATER SECURITY ON THE FRASER COAST
Objective 4: Third party users of Recycled Water are provided with a range of supply security options that support their businesses, while balancing Council's risk of regulatory non-compliant discharge.
Objective 5: The capability to augment drinking water supplies with Recycled Water in the future is not eliminated or made impossible.
THEME 4: GOVERNANCE FRAMEWORK OF RECYCLED WATER ACTIVITIES
Objective 6: The quantity of Recycled Water beneficially reused across the Fraser Coast is maximised.
Objective 7: Council provides leadership in recycled water management with respect to legislative compliance, protection of public health and the environment.
Objective 8: Recycled Water pricing considers cost recovery, community benefit and the need to achieve strategic objectives.
Objective 9: Recycled Water supply is a core business of the WBW commercial business unit.
THEME 5: RECOGNISING AND OPTIMISING FORESTRY RESOURCES
Objective 10: Forests and associated lands are managed to assist in achieving recycled water utilisation objectives.
Objective 11: Forests and associated lands are managed in a commercial manner.
THEME 6: ENABLING INFRASTRUCTURE
Objective 12: Planning of recycled water infrastructure is developed by consideration of strategic objectives in themes 1 through 5.

The following chapter presents a discussion of each theme strategic position and actions.

4 Objectives and actions

4.1 THEME 1: RECOGNISING AND OPTIMISING RECYCLED WATER AS A RESOURCE

OBJECTIVES

- Recycled Water is managed and planned in a way that recognises it is a valuable resource for the Fraser Coast community, within regulatory frameworks.
- Recycled Water is beneficially utilised and discharge to the environment is minimised.

STRATEGIC POSITION

Recycled water is provided by the Fraser Coast Regional Council for irrigation of agriculture, recreation, forestry, and other uses. The region is anticipating significant future population and tourism growth over the next 25 years and is developing a Recycled Water Strategy to accommodate expected changes to the generation and use of recycled water.

Current recycled water sharing is managed to achieve the following supply priorities:

- Third party users
- Plantation forestry
- Discharge to environment (least desirable).

Recycled water is an enabler to many strategic objectives for environmental sustainability, community amenity and economic development initiatives as outlined in council documents including:

- FCRC Corporate Plan (2018 – 2023)
- Community Plan
- Sustainability Charter
- Economic Road Map Implementation Plan
- WBB Sport & Outdoor Recreation Infrastructure Strategy
- Wood Encouragement Policy
- Fraser Coast Events Strategy.

Community consultation strongly indicates that recycled water is seen by the community as a valuable resource which should be utilised to its full potential. Recycled water use is currently dominated by agriculture and forestry with potential for the agricultural sector to increase water use. Around 5000 ML of recycled water is used annually, equating to 101% of the Average Dry Weather Flow.

Consultation with industry and community stakeholders highlighted the following:

- There is sufficient demand for Class B recycled water and sufficient irrigated agriculture opportunities in the region.
- An engaged customer base is present who are very supportive of the system and the relationship they maintain with Fraser Coast Regional Council.
- Current agricultural commodities are going through a state of transition, with the future of the local sugarcane industry uncertain and a number of alternative grain and pulse crops being trialled and commercially produced. Future irrigated agricultural crops are more likely to have greater evenness in water demand, particularly during winter months.
- The region has positive projections of suitability for a number of high value annual and perennial horticulture crops which is anticipated to continue to attract agricultural investment in the region.

There is uncertainty as to the mix of agricultural crops that will be produced in the region over the next 30 years. It is important that the five-yearly review process assesses the development opportunities of annual and perennial agriculture and continues to determine the likely annual water use profile.

Investigations undertaken for the preparation of the new Fraser Coast Planning Scheme 2024 indicate that while no significant change to the current urban footprint is anticipated, under high series population growth projections for the life of the new scheme (2041), natural expansion to the Hervey Bay urban area will be to the south of Chapel Road through to Booral Road. Monitoring of development trends in the Hervey Bay area will be important to ensure that the timing of irrigation infrastructure expansion is appropriate. This will involve the identification of thresholds for the transition of land to urban development to trigger revisions to the Strategy.

ACTION		DETAIL
1.1	Continue to engage with current and future recycled water users to understand their changing needs	▪ Stay informed on the trends in agriculture ▪ Monitor changing needs of recycled water clients including volume, timing and quality of water required ▪ Review suitability of enabling infrastructure development to meet the growth opportunities ▪ Monitor the appropriateness of Class B recycled water for changing agriculture enterprises ▪ Engage with potential new recycled water customers to ensure scheme expansions are based on realistic projections of water use and agricultural viability
1.2	Implement the water balance and ED model to assess regulatory performance under different planning scenarios	▪ Continue to assess the probability of regulatory breaches and the probability of running short of recycled water if scheme dynamics change
1.3	Develop a recycled water property planning strategy	▪ For Hervey Bay, develop additional first party irrigation areas to maintain 30% (nominally) of area under FCRC control as the scheme expands ▪ For Hervey Bay, develop a strategy in areas of urban encroachment to dispose of existing properties and acquire new properties, including accounting mechanisms for disposals to fund new acquisitions ▪ Use the Property Planning Strategy to inform the Fraser Coast Planning Scheme 2024 of implications if urban encroachment occurs faster than considered in the Housing Diversity and Land Supply Study (Urbis 2022)

4.2 THEME 2: TRIPLE BOTTOM LINE SUSTAINABILITY

OBJECTIVES

- Recycled Water outcomes and performance are measured through a balanced view of cost and benefit through a Triple Bottom Line framework, taking into consideration community values.

STRATEGIC POSITION

Informal and traditional processes are in place to evaluate infrastructure and expansion options. A full triple bottom line approach historically has not been followed, although many of the principles are embedded in multi criteria analysis approaches.

Environmental sustainability reviews covering the period 2008-2020 have indicated that recycled water irrigation activities are sustainable. The region's recycled water schemes are critical for Council to comply with current Environmental Authority conditions and avoid discharge to the Great Sandy Straits biosphere.

A Triple Bottom Line framework provides an opportunity to consider the merits of a recycled water scheme considering the impacts on the following:

- *Social/community (benefits to community and other users)*
- *Environmental (protection of waterways, reduced waste, avoided discharge, reduced carbon footprint)*
- *Economic (benefits to regional economy and private users).*

To determine the social, environmental and economic costs and benefits of future recycled water scheme developments, a Triple Bottom Line (TBL) assessment was undertaken for each of the scheme base cases and options.

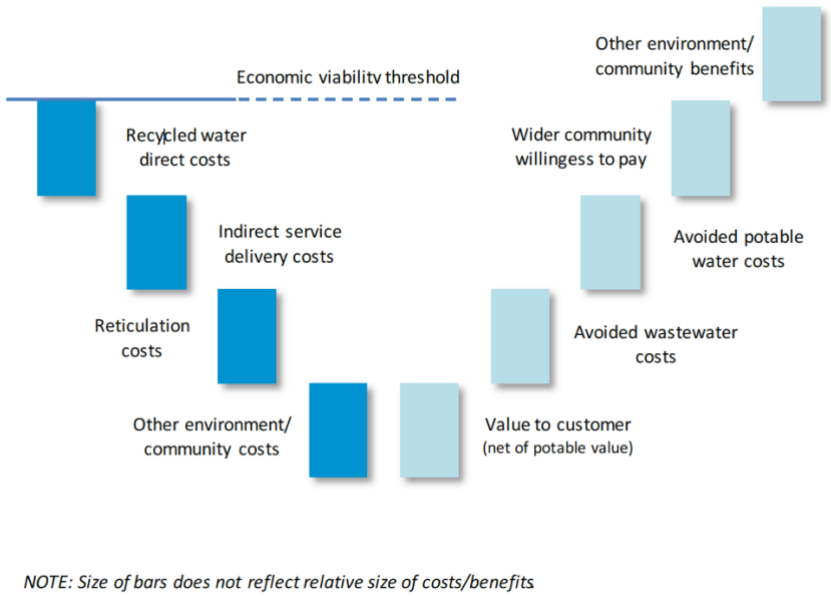
The TBL assessment included:

- **Qualitative** – subjectively scoring each option against these Fraser Coast Recycled Water Objectives and
- **Quantitative** – developing a spreadsheet model and undertaking an economic analysis (Cost Benefit Analysis) using the Australian Water Recycling Centre of Excellence (AWRCoE) Economic Assessment method.

The AWRCoE framework uses cost-benefit analysis (CBA) as the basis for evaluating non-potable recycled water projects. CBA is considered the most robust method for examining the economic viability of investments and is the preferred method of analysis for most State and Commonwealth agencies.

The framework uses the well-established concept of total economic value (TEV) to assess the value of costs and benefits. TEV includes both use values, which measure the value of using recycled water, and non-use values, which refer to an individual's willingness to contribute to the cost of water recycling, even if the individual will not use the water from the scheme. The non-use values of water recycling may, for example, include environmental benefits or a community preference for 'sustainable' water management.

The primary costs and benefits considered in the economic evaluation are described in Figure 4-1. If the benefits (light blue) outweigh the costs (darker blue), the scheme is considered to be economically justified.



NOTE: Size of bars does not reflect relative size of costs/benefits

Figure 4-1: Economic framework showing primary costs and benefits

The primary costs identified in the framework include:

- **Recycled water direct costs:** the present value of all upfront and ongoing expenditure required to construct and operate the scheme. Scheme costs vary greatly depending on a range of factors including the level of treatment, distribution costs, land use zoning, and economies of scale
- **Indirect service delivery costs:** other service delivery costs include any modifications or additions required to the wastewater treatment and distribution system and the marginal administrative costs required to support the recycled water scheme
- **Infrastructure:** the infrastructure required to transport recycled water to individual users. It is usual for agricultural users to provide their own on-site infrastructure (distribution pipework, pumps if required and on-site storages if required)
- **Other environment/community costs:** a range of other costs have been identified in previous project evaluations but as they are project specific, they have not been separately identified in the general framework.

The primary benefits identified in the framework include:

- **Use value (net of potable use value):** the benefit that will be gained by an individual or business that is supplied with recycled water. Where recycled water substitutes for potable water, the value of potable water must be netted (subtracted) from the use value as the customer will no longer receive potable water. If the recycled water is a perfect substitute for potable water, then the use of recycled water will represent neither a net cost nor a benefit. If recycled water does not substitute for potable water, then the value will reflect the user's willingness to pay for the recycled water, which will vary depending on the use of the water and the alternative options available to the user.
- **Avoided wastewater costs:** the present value of avoided capital and operating costs associated with reduced wastewater volumes, in particular reduced wastewater disposal costs. Many water recycling schemes have been implemented to avoid the high cost of meeting environmental discharge obligations, which may require high levels of treatment or long-distance outfall pipelines.
- **Avoided potable water costs:** the present value of avoided capital or operating costs associated with reduced potable water use. The avoided potable water costs are often dominated by water source deferral benefits, however some savings in distribution, storage and reticulation may also be possible, particularly in greenfield schemes where infrastructure has yet to be laid.
- **Community willingness to pay (non-use):** research (including a choice modelling survey undertaken as part of the AWRCoE study) has indicated that the broader community is prepared to provide a contribution toward the costs of water recycling, even if they do not directly use the recycled water. To avoid double counting, the community's willingness to pay for recycled water must exclude the direct benefits included in other elements of the analysis, such as avoided wastewater and potable water costs. Whilst community consultation strongly indicates that recycled water is seen as a valuable resource which should be utilised to its full potential, a conservative approach has been used in applying this value to the model.
- **Other environmental/community benefits:** this final element only applies if the benefits have not been completely captured in the other elements of the framework. Many ad hoc benefits have been identified for specific projects, including environmental and health benefits. Many of these benefits can be quantified by understanding the impact on the community or their willingness to pay for the identified benefit.

The RMCG TBL assessment is provided in the FCRC Recycled Water Options Selection report (RMCG, 2022).

ACTION		DETAIL
2.1	Apply the triple bottom line (TBL) framework for recycled water use	▪ Ensure that all future options meet the Fraser Coast Recycled Water Strategic Objectives ▪ Analyse future options using the Total Economic Value model based on the AWRCoE Economic Assessment method
2.2	Undertake five yearly reviews of the future recycled water options including new information in the RMCG model	▪ Consider the changing operating context and apply the Total Economic Value model as new information becomes available ▪ Continue to monitor the environmental, social and economic benefits and cost for different stakeholders
2.3	Maintain sustainability of recycled water use on land	▪ Continue to monitor recycled water salinity and inform sewerage network asset management and investment to control saline water ingress ▪ Continue with 5 yearly sustainability review of recycled water use
2.4	Maximise external funding for recycled water infrastructure	▪ Develop Enabling Infrastructure projects in advance of requirement to "shovel ready" stage to maximise funding opportunities ▪ Seek funding for carrying out a study to evaluate the community willingness to pay in a more localised context for using recycled water

4.3 THEME 3: CONTRIBUTION TO WATER SECURITY ON THE FRASER COAST

OBJECTIVES

- Third party users of Recycled Water are provided with a range of supply security options that support their businesses, while balancing Council's risk of regulatory non-compliant discharge.
- The capability to augment drinking water supplies with Recycled Water in the future is not eliminated or made impossible.

STRATEGIC POSITION

FCRC is a provider and user of class B recycled water for low exposure Agricultural and Municipal uses. Recycled water is shared through a hybrid volumetric allocation system ('Unrestricted' to encourage use and 'fixed portion' when scarcity occurs) with 2700 ML of storage available across the recycled water schemes (including plantations), which serve to balance inflow and demand. The hybrid allocation system is generally accepted by users; however, some concerns have been raised regarding equity of the allocation system. Third party users of the scheme are likely to continue with agricultural crops (sugar cane, macadamia nuts and cotton, public open space and plantation forestry).

To ensure security of recycled water, storage options need to be considered including: on farm storage, existing plantation storages as scheme storages (in and out) rather than terminal storages (in only) and/or provision of additional storage as part of scheme expansion options.

The development of a regional Water Supply Security Strategy has recently been undertaken. Part of this strategy was the consideration of indirect potable reuse. The integrated Hervey Bay recycled water scheme (which takes supply from the Eli Creek, Pulgul and Nikenbah STPs) is the prime candidate for this purpose, but the strategy does not recommend IPR in the short or medium term.

Current pricing for recycled water appears appropriate, given the role of recycled water in avoiding higher costs to wastewater customers. However, prices appear lower than the willingness to pay of some recycled water users, and the potential exists to introduce a high-reliability allocation to users who may particularly value this service. The notion of "reliability of supply" can vary from farmer to farmer and crop to crop. Some commodities are very sensitive to moisture stress, and even if the water is available (for example) on average 95% of the time, significant losses in yield can occur if those periods of water unavailability coincide with critical crop needs.

The pricing review has highlighted the potential to initiate a simple two-tier system (as an evolution of the current framework) to increase security options for some users, for example those that are irrigating perennial horticulture.

ACTION		DETAIL
3.1	Develop an allocation system that meets strategic objectives including the potential for a high reliability allocation	▪ Develop and implement a two-tier allocation system based on "general security" and "high security" ▪ Implement an overall target level range of security in line with regional raw water irrigation schemes
3.2	Provide recycled water quality that is fit for purpose for a range of uses.	▪ Continue to provide recycled water as Class B as defined in the Guideline for low-exposure recycled water schemes ▪ Inform future STP capital upgrades to target a fit for purpose approach to meet the objective of the Australian Recycled Water Guidelines
3.3	For the Hervey Bay Scheme, implement storage flexibility to optimise compliance and reliability outcomes	▪ Undertake a study to determine preferred option, which may include bi-directional connection of FCRC plantation storages and/or third-party owned storages
3.4	For Maryborough, include additional storage within the recycled water scheme	▪ Undertake study to determine preferred option to increase storage by up to 300ML (nominally), which may include: – Construction of additional storages – Third-party owned storages

4.4 THEME 4: GOVERNANCE FRAMEWORK OF RECYCLED WATER ACTIVITIES

OBJECTIVES

- The quantity of Recycled Water beneficially reused across the Fraser Coast is maximised.
- Council provides leadership in Recycled Water management with respect to legislative compliance, protection of public health and the environment.
- Recycled Water pricing considers cost recovery, community benefit and the need to achieve Strategic Objectives.
- Recycled Water supply is a core business of the Wide Bay Water (WBW) commercial business unit.

STRATEGIC POSITION

Council's current approach to meeting its obligations under the environmental authority effectively drives maximisation of recycled water use. Some treated sewage is discharged to the environment and is unable to be recycled, but this volume is environmentally sustainable and would be very expensive to reuse because it would require very large storage.

Council leadership with respect to recycled water is addressed through the implementation of Environmental and Recycled Water Management frameworks that protect people and the environment under legislation and includes:

- The Water Supply (Safety and Reliability) Act 2008
- Public Health Act 2005
- Environmental Protection Act 1994
- Work Health and Safety Act 2011.

Governance structures include dedicated water management teams to achieve legislative objectives:

- Preventing hazards from entering recycled water (Trade Waste team)
- Removing using treatment processes (Process Operations – STP team)
- Reducing Exposure (Reuse team).

Environmental reviews are conducted every 5 years to review potential impacts to groundwater, surface water and soils. There has been 97.7% compliance with Council's Environmental Authority achieved between 2013-2020.

Water quality has been maintained as 'fit for purpose' under the Public Health Act. Water recycling has prevented around 600 tonnes of nitrogen and 200 tonnes of phosphorus entering the Great Sandy Straits from 2013-2020. Carbon sequestration by forestry is estimated at 180,000 tonnes to date, with 10,000 ACCU's to be monetised from recent plantings.

The pricing for recycled water was developed many years ago with Council applying a tariff. The basis of this tariff requires testing applying economic analysis to ensure appropriate cost sharing. Current pricing for recycled water appears appropriate, given the high avoided costs and alignment with National Water Initiative principles. However, prices appear lower than the willingness to pay of some users, and as previously highlighted the potential exists to introduce a high-reliability allocation to users who may particularly value this service. The revenue from recycled water tariffs is minimal when compared with the benefit of avoided costs. For this reason, third-party use should be encouraged and is highly cost-effective for council.

Council has a dedicated recycled water management team that operates Council's plantations and supplies recycled water to private customers. The current scheme is a hybrid with Council supplying recycled water to private customers as well as operating irrigated plantation forestry.

ACTION		DETAIL
4.1	Implement recommendations from the Price and Tariff Options review	▪ Expand on the Price and Tariff options review by surveying customer Willingness to Pay, potential revenue opportunities and avoided costs

4.2	Formalise recycled water governance and management	▪ Develop a Council Recycled Water Policy and include: – Suitable KPI's from recycled water management, including continuing with 90% ADWF across all schemes – Allocation/water sharing framework and KPI's ▪ Investigate value in developing a Recycled Water Management Plan aligned to requirements of Water Supply (Safety and Reliability) Act 2008 (as opposed to existing recycled water management system) to include: – Consideration of Australian Guidelines for Water Recycling – Third party user management, agreements and audits
4.3	Improve wet weather management capabilities of recycled water schemes	▪ Develop strategy to engage with regulatory bodies to better manage wet weather discharges for recycled water management in wet years
4.4	Develop additional storage in Hervey Bay to manage compliance as the scheme expands	▪ For Hervey Bay, undertake study to determine preferred option to increase storage by up to 1425 ML (nominal) during the planning horizon, including: – FCRC owned storage – Third party user storage

4.5 THEME 5: RECOGNISING AND OPTIMISING FORESTRY RESOURCES

OBJECTIVES

- Forests and associated lands are managed to assist in achieving Recycled Water utilisation objectives.
- Forests and associated lands are managed in a commercial manner.

STRATEGIC POSITION

Council owns and operates seven plantations with a total area of almost 500 hectares. Approximately half of the plantation area is under a power pole supply contract (commercial estate) and the remaining area is mixed species.

There is strong community support for forestry with previous community engagement indicating a majority of respondents highly support a forest plantation program. Qualitative feedback also included expectations that forests should maximise return on investment and rate payer benefits.

Water Balance

The plantations are operated to balance consistent effluent production with inconsistent agricultural consumption. Forestry activities avoid ocean discharge of around 2500 ML/yr and comprise around half of all recycled water used in the region.

Plantations provide first-party control over recycled water use, and a relatively consistent usage profile across all seasons. Modelling indicates that compliance outcomes for nutrient discharge, customer availability and risk of storage overflow are impacted when first-party options fall below target thresholds. Enabling infrastructure expansion considers first party forestry options in line with these thresholds. For example, for the Hervey Bay scheme this threshold is for the total irrigatable hardwood plantation to exceed around 30% of the overall irrigation area.

Commercial

A Forest Management Plan and financial model have been developed to maximise return on investment to FCRC. Supply commitments exist for hardwood poles, and species not suited to poles will be harvested for other wood products based on their highest and best value.

Recycled water hardwood plantations can now be listed as an Emissions Reduction Fund registered project under the Carbon Credits (Carbon Farming Initiative) Act 2011 (the Act). Although the Emissions Reduction Fund scheme has been running for several years now, the plantation method was only introduced in 2017. FCRC registered the first project of this type in Australia in 2020 and has seen an approximate doubling of ACCU spot price over this time. Whilst retrospective application of this methodology is currently not allowed under the Act, future hardwood plantations can now be registered under this scheme.

Economic outcomes of the plantations will be highly dependent on FCRC's ability to identify secondary product markets for hardwood. Market analysis indicates that relationships will need to be developed with potential customers years ahead of harvesting to ensure alignment of the product strategy with market product specifications and demand.

State-owned native timber production will end in the SEQ area on 31 December 2024 under the South East Queensland Forests Agreement. Positive cash flow associated with plantations commences around 2027, and FCRC's product will have a specific advantage associated with proximity to the strengthening SEQ market.

Importantly, market research has identified that hardwood provenance is increasingly influencing customer behaviour. The sustainability narrative associated with recycled water hardwood plantations may provide access to secondary markets in the future.

ACTION		DETAIL
5.1	Maintain and implement the Forest Management Plan aligned with the requirements of the Australian Forestry Standard (AS 4708-2007)	▪ Review pole supply contracts considering product classes and supply options. ▪ Consider expansion of market opportunities for thinning activities (e.g. collaboration with universities and government departments)

		▪ Review business justification for AS4708 (Sustainable Forest Management) certification ▪ Develop secondary market options identified in the 2020 Hardwood Plantations Market and Species study ▪ Investigate opportunities to apply carbon farming framework to existing plantations under the newly released 2022 plantation forestry method ▪ Investigate forestry practice to improve or replant underperforming blocks as outlined in the Forest Management Plan
5.2	Undertake five yearly reviews of future recycled water options	▪ Compare the financial return of forestry and agriculture to inform future assessments of the long-term water volume going to plantations and agriculture
5.3	Develop first-party forestry options in line with enabling infrastructure expansion	▪ Assess future forestry expansion options using Plantation Estate Financial Model and AWRCOE TBL economic model

4.6 THEME 6: ENABLING INFRASTRUCTURE

OBJECTIVES

- Planning of Recycled Water infrastructure is developed by consideration of Strategic Objectives in Themes 1 through to 5.

STRATEGIC POSITION

Population growth and land use change is expected to have an impact on the quantity of recycled water available as well as the need for recycled water irrigation in certain areas. For the schemes to grow sustainably, they must evolve in a planned way which ensures alignment with Council's Recycled Water Strategic Objectives.

In order to determine infrastructure investment a Triple Bottom Line Assessment Framework was used to evaluate shortlisted infrastructure options.

This review included consultation with recycled water customers, prospective customers, and industry representatives to understand future industry directions.

Enabling infrastructure options were then shortlisted following a review of alternatives including dual reticulation, construction lined lagoons for evaporation, indirect and direct potable reuse, potential scheme interconnections and industry directions.

Decisions on infrastructure investment have been guided by the quantitative and qualitative analysis (Refer to FCRC Recycled Water Options Selection report (RMCG, 2022)).

The infrastructure options will be revisited with the review of the strategy at least every 5 years, or as required to maintain currency with market or legal requirements.

Key infrastructure planning decisions need to be made in the short-term in relation to expansion of Hervey Bay recycled water scheme responding to rapid urban growth and consequent projected increase in sewage and recycled water.

ACTION		DETAIL
6.1	Implement Hervey Bay Scheme expansion	**Stage 1** ▪ Expand the recycled water scheme south along Vanderwolf Road to service existing agricultural farming enterprises in the area as new third-party recycled water customers ▪ Construct additional storage in the scheme to manage compliance and reliability outcomes ▪ Investigate and evaluate the best long term (Stage 2) expansion options for development when the scheme expansion options in the Vanderwolf Road are fully exhausted **Stage 2** ▪ Depending on the outcomes of investigations and other considerations which may arise in the meantime, expand the scheme further south across Susan River or west to Stockyard Creek area to supply more third-party agricultural customers. ▪ Infrastructure decisions will need to consider that expansion south across Susan River may facilitate a future scheme interconnect between Hervey Bay and Maryborough, whereas expansion west may facilitate an ultimate connection to Cassava properties **Other Investigations** ▪ Investigate option of discharging higher quality treated effluent volumes during wet weather by returning effluent from the Nikenbah STP to existing licensed outfall locations ▪ Investigate options to maximise benefit of up to 400 ML of existing storage by installing bi-directional pipework from existing plantation storage dams to the network

6.2	Implement Maryborough Scheme expansion	▪ Extend existing recycled water distribution pipeline to the west of Four Mile property to supply new third-party agricultural customers ▪ Alternatively, investigate feasibility for a new recycled water distribution pipeline from Maryborough storage to northeast in Prawle Rd which may facilitate a Hervey Bay scheme interconnection ▪ Construct additional storage in the scheme to improve reliability of supply to existing and new customers
6.3	Implement Burrum Heads Scheme expansion	▪ Find a second-party tenant to farm the site using an EOI process ▪ Investigate and evaluate the long-term expansion options with the potential for development of a first-party plantation or second-party agriculture.
6.4	Implement Toogoom Scheme expansion	▪ Extend recycled water scheme to Council owned land ▪ Find a second-party tenant to farm the site using an EOI process ▪ Investigate and evaluate the long-term expansion options with the potential for development of a first-party plantation or second-party agriculture.
6.5	Implement Howard Scheme expansion	▪ Implement Howard Reuse strategy in line with the *Howard Sewerage Scheme - Planning Report* including establishment of staged tree plantations at new site in Cemetery Road.
6.6	Undertake five yearly reviews of future recycled water options including new information in the RMCG model	▪ Incorporate new information that becomes available for each scheme and consider changing context

5 Implementation planning

5.1 DELIVERY TIMELINE

A delivery timeline for the implementation of the 30-year strategy is provided in the following table (Table 5-1).

Table 5-1: Strategic Themes and Objectives for the Recycled Water Strategy

ACTION		DELIVERY TIMEFRAME						
		2022	2027	2032	2037	2042	2047	2052
THEME 1: RECOGNISING AND OPTIMISING RECYCLED WATER AS A RESOURCE								
1.1	Continue to engage with current and future recycled water users to understand their changing needs							
1.2	Implement the water balance and ED model to assess regulatory performance under different planning scenarios							
1.3	Develop a recycled water property planning strategy							
THEME 2: TRIPLE BOTTOM LINE SUSTAINABILITY								
2.1	Apply the triple bottom line (TBL) framework for recycled water use							
2.2	Undertake five yearly reviews of the future recycled water options							
2.3	Maintain sustainability of recycled water use on land							
2.4	Maximise external funding for recycled water infrastructure							
THEME 3: CONTRIBUTION TO WATER SECURITY ON THE FRASER COAST								
3.1	Develop an allocation system that meets strategic objectives including the potential for a high reliability allocation for users							
3.2	Provide recycled water quality that is fit for purpose for a range of uses.							
3.3	For the Hervey Bay Scheme, implement storage flexibility to optimise compliance and reliability outcomes.							
3.4	Include additional storage within the Maryborough recycled water scheme.							

THEME 4: GOVERNANCE FRAMEWORK OF RECYCLED WATER ACTIVITIES								
4.1	Implement recommendations from the Price and Tariff Options review							
4.2	Update the Recycled Water Management Policy as part of the Wide Bay Water and Waste Quality Management System							
4.3	Improve wet weather management capabilities of recycled water schemes							
4.4	Develop additional storage in Hervey Bay to manage compliance as the scheme expands							
THEME 5: RECOGNISING AND OPTIMISING FORESTRY RESOURCES								
5.1	Maintain and implement the Forest Management Plan aligned with the requirements of the Australian Forestry Standard (AS 4708-2007)							
5.2	Undertake five yearly reviews of future recycled water options including new information in the RMCG model							
5.3	Develop first-party forestry options in line with enabling infrastructure expansion							
THEME 6: ENABLING INFRASTRUCTURE								
6.1	Implement Hervey Bay Scheme expansion							
6.2	Implement Maryborough Scheme expansion							
6.3	Implement Burrum Heads Scheme expansion							
6.4	Implement Toogoom Scheme expansion							
6.5	Implement Howard Scheme expansion							
6.6	Undertake five yearly reviews of future recycled water options including new information in the RMCG model							

5.2 INFRASTRUCTURE

5.2.1 EXPANSION FOOTPRINT

The footprint of proposed expansion of the schemes described is provided in Figure 5-1.

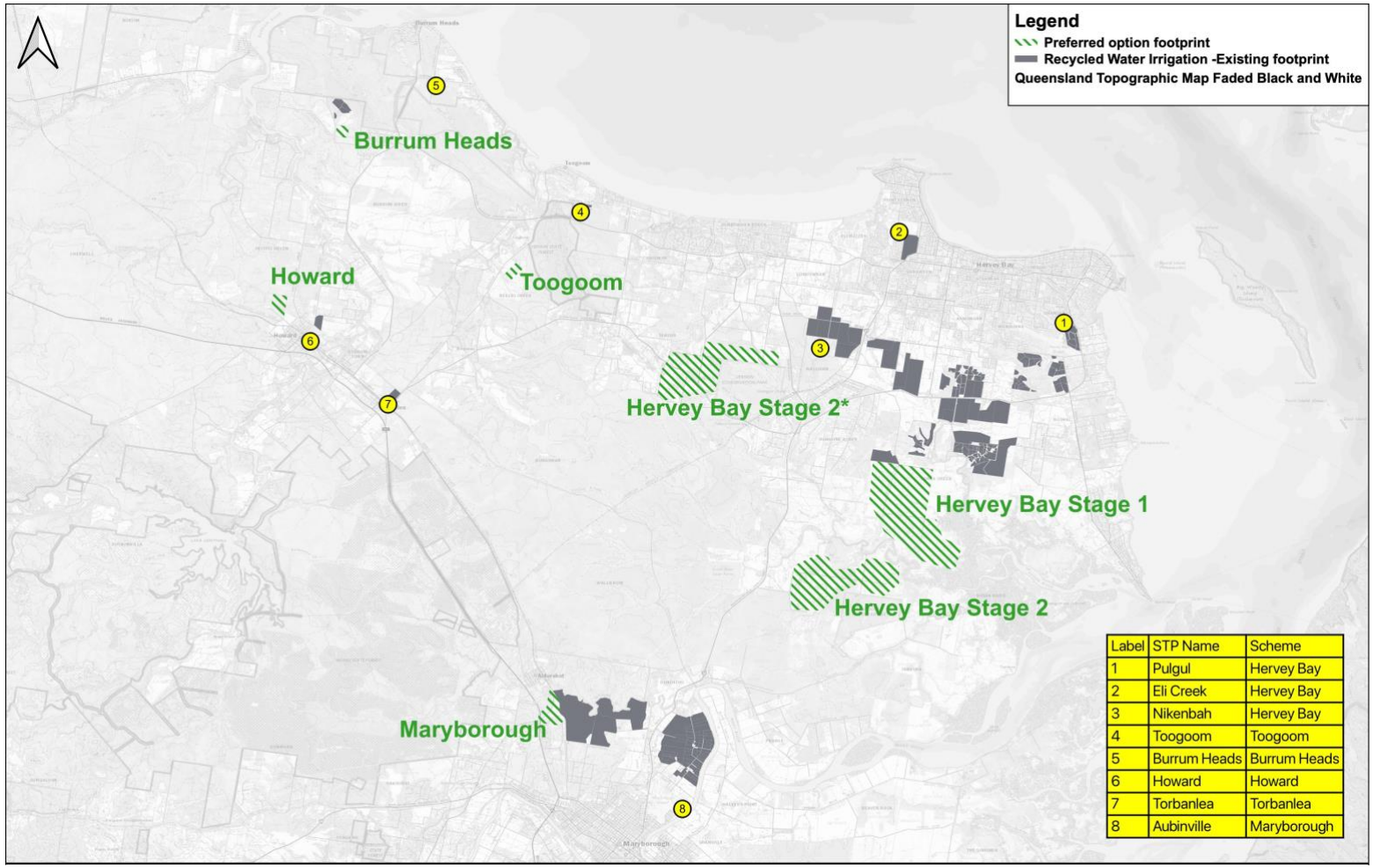


Figure 5-1: Footprint of scheme expansion

5.2.2 TIMELINE

A staged approach for delivery of the five scheme expansions is provided in Figures 5-2 and 5-3.

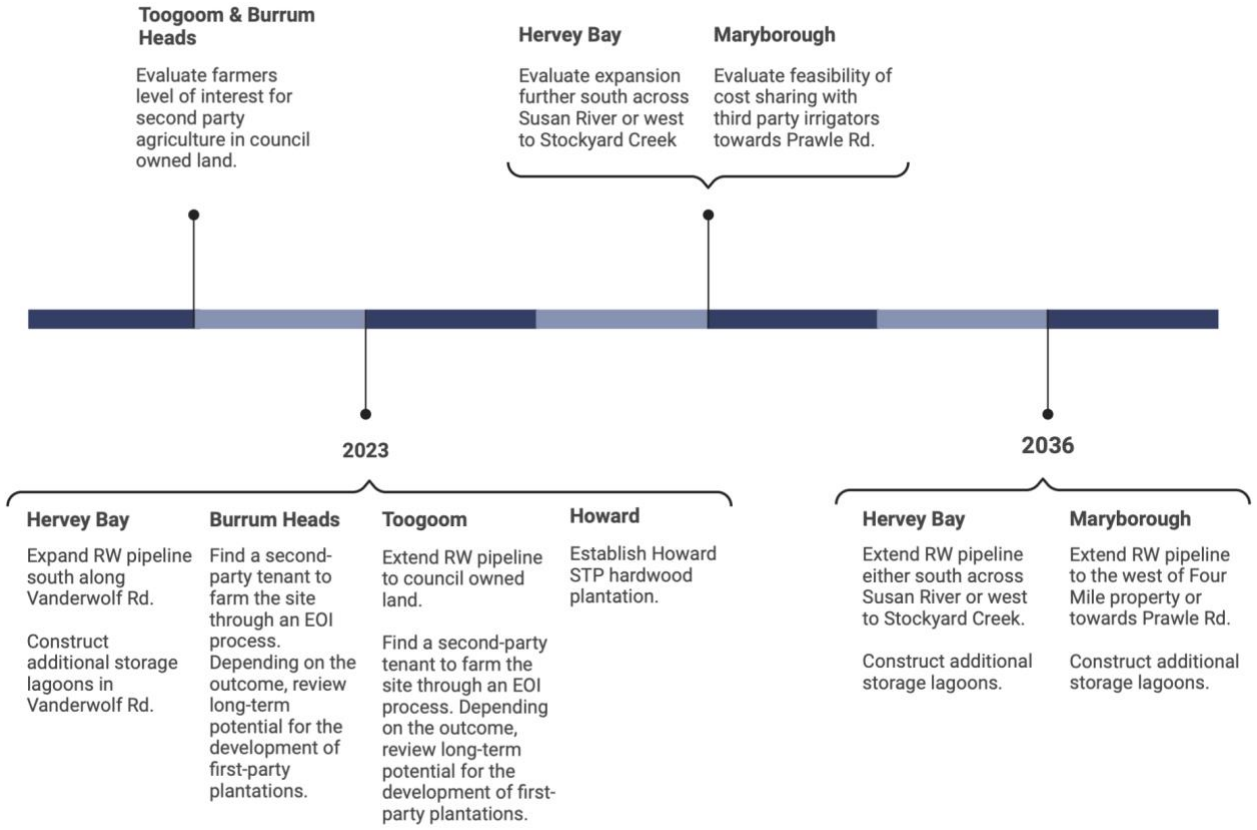


Figure 5-2: Planning horizon timeline for delivery of scheme expansions

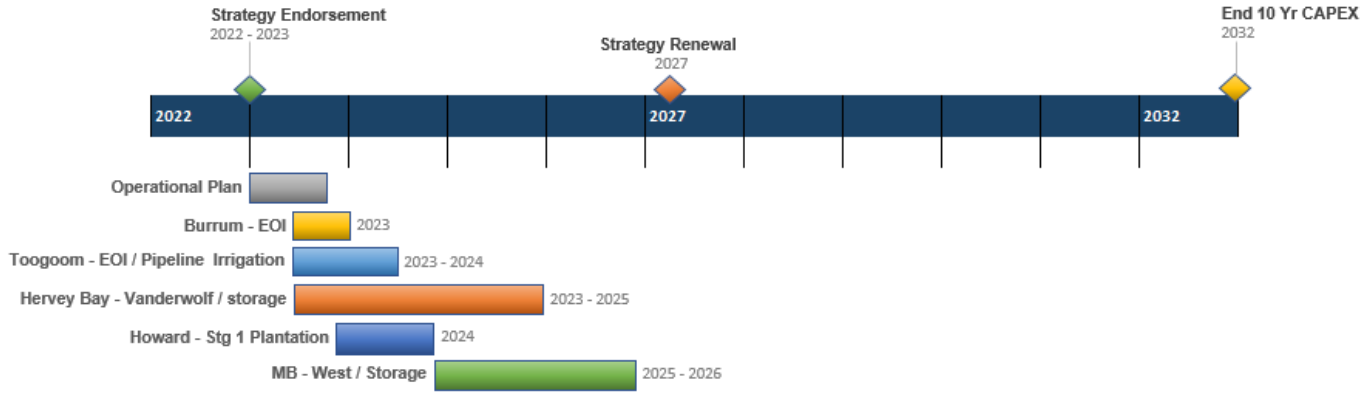


Figure 5-3: 10 Year timeline for delivery of scheme expansions

Appendix A: Strategic issues

This section presents a topic-by-topic discussion of the main issues relevant to the strategy. The topics relate to the issues identified in section 2.

A1. URBAN GROWTH

Growth in the number of properties connected to sewer is predicted, especially in the Hervey Bay area. Figure A-1 summarises how the volumes are expected to increase over the next thirty years (Ref: ED Model, FCRC). Light blue represents the existing sewage volume in 2021, and the coloured bands show the projected five-yearly increase in sewage out to 2051. The Hervey Bay recycled water scheme takes waste from the Nikenbah, Pulgul and Eli Creek sewage treatment plants. This will see significant growth in the volume of sewage generated from households that needs to be treated and then disposed of or recycled.

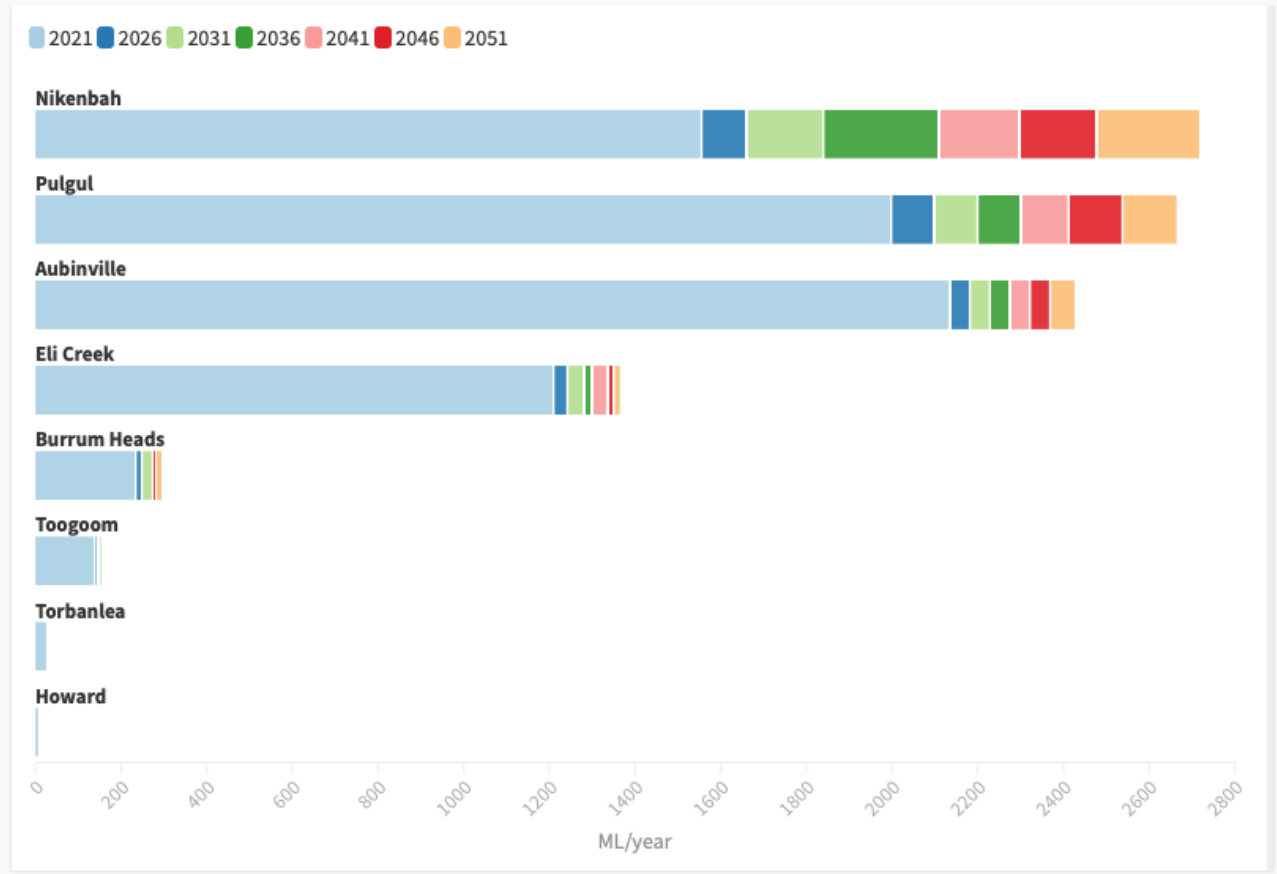


Figure A-1: Projected annual volumes of wastewater inflow to the scheme.

Investigations undertaken for the preparation of the new *Fraser Coast Planning Scheme 2024* indicate that while no significant change to the current urban footprint is warranted under high series population growth projections for the life of the new scheme (2041), it is acknowledged that the ultimate (beyond the life of the draft scheme) natural expansion to the Hervey Bay urban area will be to the south of Chapel Road through to Booral Road. For this reason, the draft planning scheme identifies an urban investigation area in this locality to ensure that if other existing locations within the urban footprint fail to realise timely development, planned densities are not delivered, or if projected demand exceeds expectations, future urban growth fronts are carefully planned in advance of development.

The draft *Fraser Coast Planning Scheme 2024* will seek to limit the expansion of the current urban area by strongly supporting infill development. This policy direction will seek to consolidate the urban footprint and, by default, extend the water reuse schemes current asset utilisation horizon. This policy seeks direction is

supported by impacts on Councils medium-long term financial viability resulting from the creation of underutilised, out of sequence and stranded infrastructure, and increasing service delivery expectations.

Should urban development south of Chapel Road eventuate more quickly than currently projected and planned, there will be a partial overlap and an interface between new urban development and irrigated plantations and agriculture within the 10-year statutory review period for the new planning scheme. While the current *Fraser Coast Planning Scheme 2014* includes outcomes which seek to protect infrastructure and agricultural land uses from urban encroachment and other incompatible land uses to ensure their continued operation and viability, there are no specific outcomes or mapping relating to Council's plantations or water reuse scheme infrastructure. Opportunity exists to incorporate specific outcomes and mapping in the new planning scheme should Council wish to manage potential conflicts arising from unforeseen urban development.

Given the ongoing economic, demographic and market uncertainty associated with the impacts from the international outbreak of COVID-19, Council will need to review its land use demand and supply assumptions more regularly during the life of the new scheme to ensure the balance remains reflective to unpredicted trends. While the current urban development projections do not foresee significant impacts to 2031, if and when evidence suggests that Hervey Bay requires more supply of greenfield urban land, additional pressure will be placed on Council's plantations and water reuse scheme receiving sites between Chapel Road and Booral Road.

Monitoring of development trends in the Hervey Bay area over the next 5 years should occur to ensure that the planned timing of relocation of the current irrigation capacity into phase 2 of the Hervey Bay enabling infrastructure expansion can be brought forward to Stage 1 if required. Thresholds for the transition of land to urban development should be identified to trigger revisions to the Strategy.

A2. SEWAGE TREATMENT

The recycled scheme is presently a Class B scheme, and the treatment plants are all capable of meeting or exceeding Class B. Some potential recycled water uses (such as irrigating public open spaces with unrestricted access, irrigating vegetable crops and discharge to waterways) require a higher level of treatment, such as nutrient removal, Class A or Class A+.

Two phases of consultation have been completed as part of the Recycled Water Strategy to better understand end user requirements, which included an assessment of future/emerging use requirements, barriers to entry and understanding agricultural futures for the region. .The Fraser Coast scheme is currently defined as a Class B provider and user of recycled water for low exposure Agricultural and Municipal uses. The framework to establish this definition is drawn from Public Health Guidelines and will continue to apply. Class B is satisfactory for the vast volume of recycled water uses, and customers who require better quality can install treatment systems at the point of use for their own purposes.

New customers to the scheme will be assessed based on the following guiding principles:

- If a proposed use is specifically detailed in the Guideline for Low-exposure Recycled Water Schemes (Queensland Health), the recommended quality and on-site control will be adopted
- If an intended use is specifically detailed in sections of the Public Health Regulation 2018, the recommended quality of recycled water and method of irrigation will be adopted
- If the proposed use is not covered in these guidelines, the Australian Guidelines for Water Recycling (Treatment processes and on-site controls for designated uses of recycled water from treated sewage) will apply.

Council is currently updating its Sewerage Strategy which will look at future options and infrastructure requirements for collection and treatment of sewage in the longer term. The Sewerage Strategy is due for completion in late 2022. There is a necessary linkage between the Sewerage Strategy and the Recycled Water Strategy because the quality and the location of the treated water for recycling is a function of the sewerage strategy and vice versa. In terms of geographical location for sewage treatment, this recycled water strategy assumes that the recycled water will be available at the existing locations. It may be that the Sewerage Strategy

concludes that some treatment plants and volumes may be different in future (e.g. Eli Creek STP could be abandoned and converted to a sewage pump station with all of the sewage being treated at Nikenbah STP) but the drivers for this decision are predominantly dictated by the complex nature of sewage treatment planning and so the Recycled Water Strategy will need to adapt to any proposed relocation of treatment facilities.

A3. ENVIRONMENTAL DISCHARGE

Permit conditions (Ref: Environmental Authority – EPPR00815913) for Fraser Coast Regional Council regarding discharge of treated wastewater to the natural environment may become stricter in future but are very unlikely to be relaxed.

The state government has a focus on protecting the coral reefs along the Queensland coast, and effluent discharges are one source of concern. One example of this Wastewater Stewardship Strategic Assessment project. This project is part of the Queensland Reef Water Quality Program with the government committing $270.1 million up to 2025–2026 for this program.

All recycled water schemes need to have a volumetric discharge option because in high rainfall years the ability to apply water to land in a sustainable way is reduced. During wet years, crop demand for irrigation water can be greatly reduced, and it is impractical to construct sufficient storage to accommodate the excess water.

A4. RECYCLED WATER BALANCE

A detailed water balance of the recycled water system has been developed (KBR 2022). This model allows Council to evaluate different operating scenarios under various climatic conditions.

Council has significant recycled water storages. The water balance model has explored the operating rules for these storages and how they can impact on discharges to the environment (in wet years) and reliability of recycled water supply to irrigators (in dry years).

The key findings relevant to the recycled water strategy are:

- Agricultural irrigation demand for recycled water is very sensitive to climate.
  - In wet times, agricultural crops cannot be irrigated because waterlogging can cause damage to crops and increase the risk of runoff or recharge of recycled water to the environment.
  - In dry times, farmers who rely on recycled water to supplement the natural rainfall, can be exposed to production losses. Some crops are more sensitive to soil moisture deficits than others. A small amount of recycled water in very dry times can be very valuable for agriculture, but a break in supply can be disastrous if it coincides with critical crop phases or very hot weather.
- Plantation forestry is a flexible user of recycled water because the hardwood trees can (within limits and without detriment to timber production), receive little recycled water in dry times and receive surcharge volumes during wet periods. This function of plantations provides an effective ‘storage’ within the soil that can be usefully managed to both reduce the frequency or spills to the environment and also increase the reliability to agricultural irrigators.
- Storage can be managed in a way that improves the reliability of supplies to agricultural irrigators, but the volume of storage and/or the way in which they are operated could be improved to provide better reliability of supply to agriculture.

Given the reasons outlined below, many of the existing schemes benefit from a balance between first party forestry and third-party agriculture. Figure A-2 outlines the benefits of a balanced system. The detailed water balance work by KBR suggests that a minimum threshold of 30% forestry should be maintained.

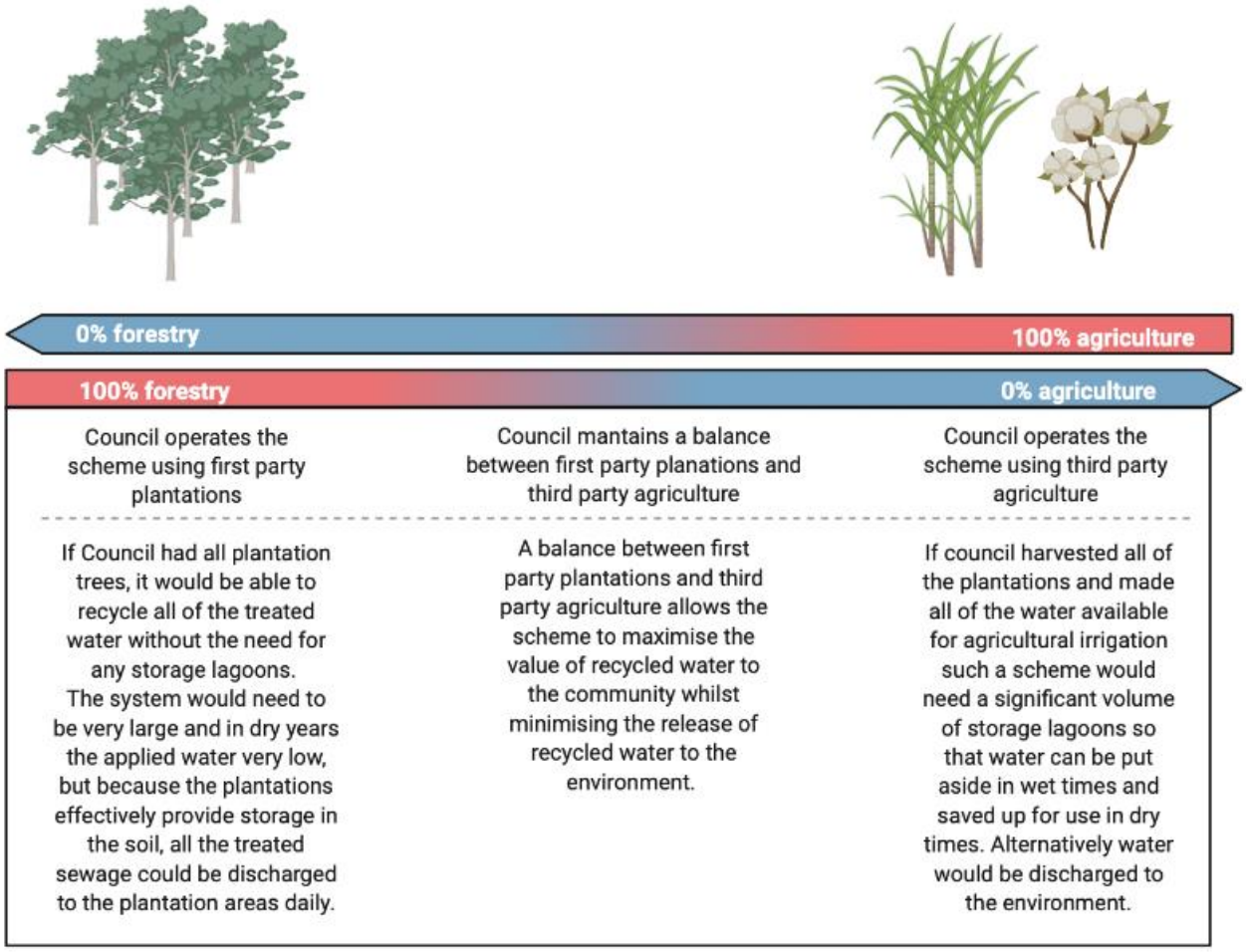


Figure A-2: Plantation forestry and agriculture balance.

Council has some great datasets to monitor annual reuse by financial year. However, for long term trends a good quality historical time-series database (with a monthly time step) would allow to monitor trends and annual fluctuations in raw sewage volumes, variability in discharges and seasonal patterns. Increasing monitoring will contribute greatly to the long-term performance of the Recycled Water Scheme.

A5. WATER RELIABILITY

INDIRECT POTABLE REUSE

A regional water security plan was prepared in 2022. It looked at options for future drinking water needs, particularly for expanding Hervey Bay. The results show that while indirect potable reuse enjoys moderate support from the community, from an engineering point of view it did not score as well as seawater desalination or a pipeline from the Mary River.

There are various ways in which IPR can be implemented. One approach is to wait until the drinking water dams are very low and introduce the recycled water as an emergency supplement. Another approach is to consider the recycled water as a constant top-up inflow into the drinking water dams. The water strategy explored the former approach but perhaps the latter approach could be more viable and be worth exploring again.

In the future, the water security report should explore some of the practical issues associated with IPR, such as how the water scheme would acquire recycled water from existing customers and what would happen to the irrigated enterprises (plantations and agriculture) if recycled water was diverted into the drinking water system. While there is still a possibility that recycled water could one day be used for indirect potable supply, at this stage it is not the preferred option.

DUAL RETICULATION

The dual system involves the provision of separate supplies for potable water and recycled water. Under such schemes the recycled water would be supplied via a separate reticulation system. This system would supply water for external household use (i.e., gardening and washdown), and possibly toilet flushing and fire fighting. Water would need to be supplied to Class A+ standard requiring a higher level of wastewater treatment.

In addition, there are arduous requirements in regard to verification of the water quality once the scheme has been constructed and stringent ongoing requirements in regard to sampling and testing of the treated water. Regular audits of the system integrity are also necessary. Use of recycled water for dual systems is regulated under the Water Supply (safety and Reliability) Act 2008.

This option has been previously assessed and ruled out because of the high availability of agricultural use, and the high cost of providing suitable treatment and monitoring and maintaining the high-quality water that is required to service such developments.

AGRICULTURE RELIABILITY

Agricultural irrigators are concerned about the reliability of their recycled water supply because this can affect the profitability of their enterprise. Priority of allocation and water sharing in dry periods can be very complicated, but it is a necessary function that Council must fulfill.

Storages provide an availability benefit to non-plantation water users. Forests can store water in the soil and can go longer without being irrigated without compromising production compared to agriculture which is very sensitive to soil moisture deficits and needs regular irrigation in hot/dry times.

The existing storages should be maintained and operated for the purposes of increasing reliability to agricultural users whilst managing compliance risk. If extra agricultural area is developed, it is proposed that additional storage would be required to maintain reliability to all agricultural users.

Council must be transparent and diligent in enforcing allocations in dry periods when recycled water is in high demand and low supply. The following principles apply:

WET PERIODS	DRY PERIODS
▪ Divert water to storage to minimise the risk of spilling ▪ Use recycled water sustainably on forestry plantations ▪ Use licences to discharge to the environment.	▪ Halt use of water in plantations ▪ Draw down storage to meet agriculture demand ▪ Restrict irrigation according to a hierarchy of entitlements or in proportion to volumetric entitlements.

A6. WATER QUALITY AND PRICE

RECYCLED WATER QUALITY - CLASS

A Class B scheme is planned for the Pulgul STP upgrade, but better water quality (nutrient removal and Class A disinfection) has been specified in the upgrade so that the nutrient load to the Bay will remain steady even if future volumes discharged increase.

Class B is adequate treatment for all current agricultural uses. The risks are manageable and the costs of treating all of the water to a higher standard is not justified. End users who need higher quality recycled water can polish the water for their own needs such as the Nikenbah Sports area.

RECYCLED WATER QUALITY - SALINITY

Salinity can build up over time and have impacts on crop growth and soil chemistry if not managed. The only viable way to reduce the salinity of recycled water is by source control (as treatment processes such as reverse osmosis are not financially viable).

FCRC must then aim to reduce the salinity by:

- Limiting saltwater intrusion into the existing sewer networks
- Managing trade waste agreements by where possible reducing salt in trade waste.

RECYCLED WATER COST SHARING

Council's business unit Wide Bay Water & Waste Services manages and operates the recycled water scheme. Because the recycled water scheme is a service to the sewerage system, not something on its own, it should not be considered a profit centre. Irrespective of the profitability (or not) of the hardwood plantation enterprises and sales to third-party recycled water irrigation customers, Council needs to be assured that the operations are efficient and best practice.

Analysis of the current approach to pricing for recycled water highlights that FCRC's pricing approach is broadly consistent with the NWI pricing principles. Prices appear to be lower than agricultural willingness to pay, however recycled water provides a significant service to wastewater customers in avoiding significant costs of system upgrade and thus can be justified at their current level.

Current pricing for recycled water appears appropriate, given the role of recycled water in avoiding higher costs to wastewater customers. However, prices appear lower than the willingness to pay of users, and the potential exists to introduce a high-reliability allocation to users who may particularly value this service.

A7. FUTURE TRENDS

IRRIGATED AGRICULTURE

Availability of irrigation water is but one of many factors that determine the viability of agricultural enterprises. The extra contribution to production generated by recycled water is important at a local scale but has minimal contribution when compared to total production across the region. If Council was to discontinue supplying recycled water to farmers that would have localised impacts on individuals but not at the industry scale.

Farmers in the region continue to both stick to traditional crops and are trying alternatives. For existing agricultural customers, Council should not really have any strong opinion on the cropping or grazing enterprise that the farmer chooses to undertake, provided that the crop is a high water use crop, and the farmer maximises the irrigation. If additional land is developed for agricultural irrigation, Council should encourage diversity especially if that spreads the climatic demand for water across a wider growing season. There is continuing demand for recycled water for agriculture in the region.

PLANTATION FORESTRY

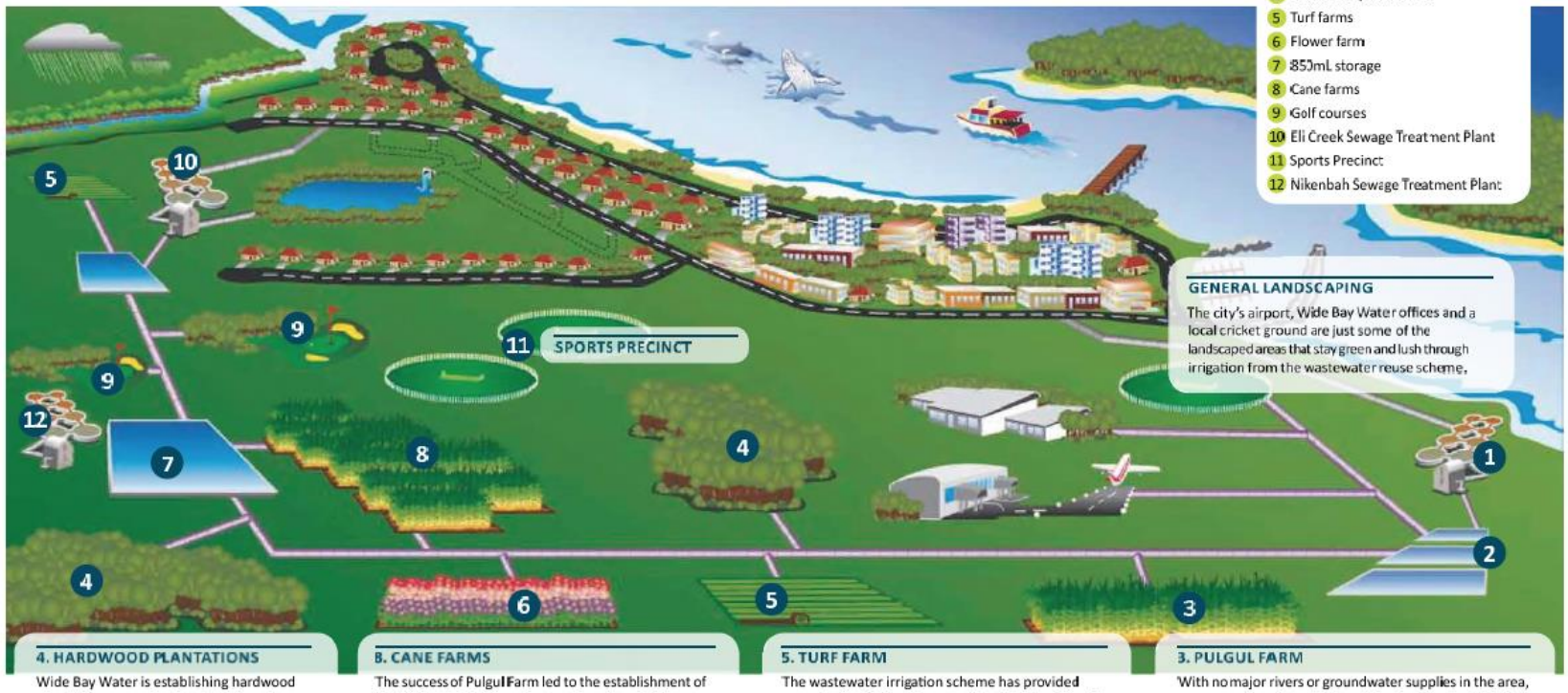
Council has pioneered hardwood plantations as an effective means of utilising the recycled water. The plantations are playing an important role in using the recycled water and in the long term will return some revenue.

At this stage none of the third-party irrigation farmers have taken up the option of irrigating plantation trees perhaps because the economics are less favourable than irrigated agriculture or due to the long-term nature of forestry and the uncertainty of recycled water availability making it less favourable for the private sector than for Council.

PUBLIC OPEN SPACE

Urban irrigation using recycled water currently represents a small fraction of the total water produced. While it is of benefit to the users (mainly open space irrigation, industrial use and non-potable uses), the success of the scheme does not depend upon this use. Recycled water can be a critical source of water for public open space during times of drought contributing significantly to the community welfare.

Appendix B: Hervey Bay recycled water scheme



9. GOLF COURSES

An average 18-hole golf course uses 100 megalitres of water a year. The wastewater recycling scheme supplies two golf courses in Hervey Bay. This source substitution conserves enough town water resources to supply the needs of about 600 homes.

4. HARDWOOD PLANTATIONS

Wide Bay Water is establishing hardwood plantations around each scheme's major storage dam to ensure the 100% reuse target can be achieved - particularly when demand from the cane industry diminishes during the non-growing season.

8. CANE FARMS

The success of Pulgul Farm led to the establishment of the Eli Creek irrigation scheme - developed with cane farmers in mind. An 850mL storage facility was created to ensure consistent supply, and eight farms connected. A ninth farm has connected via the pipeline linking the two irrigation schemes. Irrigation has seen cane yields increase by more than 40% and dollar return increase by 80% compared with previous dryland practices. Cane farmers have effectively drought proofed their operations and improved their competitiveness at a time when the state's sugar industry is in crisis.

5. TURF FARM

The wastewater irrigation scheme has provided opportunities for farming operations that traditionally struggled to exist in the Hervey Bay region, because of its lack of rivers and groundwater supplies. A turf farm near the Eli Creek treatment plant has been able to use the treated water to irrigate for some time, while the construction of the pipeline connecting Eli Creek and Pulgul has enabled another turf farm to establish - the farmer specifically buying land alongside the pipeline to connect to the scheme.

3. PULGUL FARM

With no major rivers or groundwater supplies in the area, sugar cane was farmed using dryland methods. Wide Bay Water entered into a share farm arrangement with a local farmer on 70ha of land at Pulgul to investigate the opportunities for irrigation using wastewater. The farm had been one of the worst performers in the district. In 1992 the wastewater was connected to the property. Within five years, the farm went from being the least productive to winning the Maryborough Cane Productivity Award for the highest sugar cane yield per hectare. The success of Pulgul Farm led other cane farmers to connect to the scheme.

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