



Gympie Regional Water Security Strategy – Summary Report

Gympie Regional Council

17 January 2025

→ The Power of Commitment

Contents

Introduction	1
Purpose of this report	1
Key challenges	2
Levels of Service framework	2
Adaptive pathways planning	3
Pathways	3
Hydrological assessment	4
Options definition	4
Multi-criteria analysis	5
Water security outcomes	7
Emergency water supply arrangements	8
Implementation roadmap	9

Introduction

GRC supplies drinking water to nearly 15,000 residential and commercial properties through eight separate schemes: Amamoor, Cooloola Cove/Tin Can Bay, Goomeri, Gympie, Imbil, Kandanga, Kilkivan, and Rainbow Beach. Gympie Regional Council (GRC) seeks to meet foreseeable future water needs to support economic development, community enhancement and residents' wellbeing. As part of this strategic aim, the Gympie Regional Council requested a Water Security Strategy (WSS) which aims to address:

- The challenges of aging infrastructure, population growth, water supply allocation shortfalls, climate change impacts, and future uncertainties
- Opportunities in the additional 4,000 ML/a strategic reserve assigned to GRC under the new Mary Basin Water Plan, and potential synergies with projects like Borumba Pumped Hydro Electric Scheme (PHES)

The WSS provides an adaptive approach to optimising water supply infrastructure investment while meeting the needs of a growing community within an environment impacted by climate change and other major shifts.

By establishing a strategy, GRC will have a basis to inform decision making and reduce reactive management of issues.

Purpose of this report

This report is a high-level summary of the WSS and therefore does not cover the subject matter in the same level of detail, including detail in respect of opinions or data, that might be made available in the full WSS. That is, this report is a high-level summary and should be read in this context only.

Scope and limitations

The purpose of this report is to summarise the outcomes of the Water Security Strategy (WSS) prepared by GHD Pty Ltd (GHD) for Gympie Regional Council (GRC). The WSS has been prepared under an agreed scope of work between GRC and GHD. It has been based on information reviewed at the date of preparation of the WSS, and includes a range of assumptions developed in conjunction with GRC, which are detailed in the full WSS report. This report does not include all assumptions made in the preparation of the WSS. GHD disclaims liability arising from any of the assumptions or unverified information being incorrect.

This report has been prepared by GHD for GRC and may only be used and relied on by GRC for the purpose stated in the WSS report and is not intended for use for any other purpose. This report must not, without the prior written consent of GHD, be used or relied on by any other entity or person other than GRC. GHD otherwise disclaims responsibility to any person other than GRC arising in connection with this report.

Key challenges

The major areas of concern in GRC’s current system performance are:

Table 1 Key challenges - current system performance

Sub-region	Scheme	Risk of water source shortfall ¹	WTP capacity, quality, and other concerns
Mary Valley schemes	Gympie	1 in 1.1 ²	Major structural issues and overall risk due to asset age and lack of redundancy ³
	Imbil	1 in 100	WTP capacity exceeded 2023; water quality issues ³
	Amamoor	1 in 1	Water treatment issues ³
	Kandanga	1 in 60	Water treatment issues ³
Western schemes	Goomeri	1 in 63	Water treatment issues ³
	Kilkivan	Uncertain	Water treatment issues ³
Coastal schemes	Cooloola Cove / Tin Can Bay	OK	WTP capacity exceeded ~2050 and lacks redundancy
	Rainbow Beach	OK	WTP utilisation near 90% in 2050

Jones Hill WTP in Gympie is a critical risk, as the WTP acts as the contingent and/or emergency water supply for other schemes in the region. Although some repairs have been undertaken recently, asset failure due to condition remains a possibility.

Looking forward, there is a need to determine the optimal arrangement for accessing the additional 4,000 ML/a strategic reserve assigned to GRC under the new Mary Basin Water Plan (2024). The major opportunity is to collaborate with Queensland Hydro to explore options to use Borumba Dam to store and release this reserve, as the Borumba PHES project plans to

¹ Risk assessed stochastically for 2050 demands with Water Plan (Mary Basin) 2024 model and current allocations

² Risk under current allocation of 3,464 ML/a

construct a larger storage. The study tested this concept as discussed under **Hydrological assessment**.

In addition to the key challenges noted, further work is needed to confirm treatment capacities and groundwater reliability across the region.

Levels of Service framework

A Level of Service (LoS) target of 1 in 1,000 year average recurrence interval (ARI) shortfall risk has been set by GRC. In other words, the risk of supply shortfall in the region should be less frequent than once every 1,000 years on average. This level of risk is commonly adopted across most urban centres across Queensland, while some larger cities have adopted 1 in 10,000 year ARI as a target. In addition, the WSS has targeted performance with medium level restriction (or worse) no more than 5% of the time and medium level restriction frequency of 1 in 10 year ARI.

The WSS recommends a LoS framework which aims to provide a similar service across communities, rather than the preceding framework which placed many communities in permanent restriction. The recommended LoS framework (Table 2) has been tested through hydrological modelling to meet the LoS targets projected 2050 demands.

It is noted that the western schemes have multiple criteria to trigger restrictions. GRC can adopt these criteria using either an “either/or” or “both” approach.

The Borumba Dam trigger volumes are based on the existing Borumba Dam. The Borumba PHES project will alter the storage characteristics. In addition, once the WSS is implemented such that Gympie supplies Imbil, Kandanga and Amamoor, all four communities would operate under the triggers and restrictions applied for Gympie and Imbil – although these are likely to be redefined based on the implemented arrangement for supply of the 4,000 ML/a reserve.

³ Also does not meet Health Based Targets (HBTs) for water quality under Australian Drinking Water Guidelines (ADWG), which are currently optional but will likely be mandatory in future.

Table 2 Recommended LoS framework

	Level	1	2	3	4	5
	Restriction			Medium	High	Severe
	Demand Restriction	100%	80%	65%	50%	45%
Group – community	Criteria (trigger)					
Gympie and Imbil	Borumba Dam volume (%)	Normal	<20%	<10%	<7.5%	<5%
Kandanga	GS138113A consecutive days of zero flow	Normal	91 days	243 days	304 days	365 days
Amamoor	GS138102C consecutive days of zero flow	Normal	30 days	91 days	150 days	182 days
Goomeri and Kilkivan (2 criteria)	6-month preceding rainfall (mm)	Normal	<400	<300	<200	<100
	Kinbombi storage 1 volume (ML)	Normal	<120	<80	<50	<25

Adaptive pathways planning

An adaptive pathways planning approach has been adopted for development of the WSS, considering the various future uncertainties being faced by the region. The approach provides a means for reducing risk vulnerability through a structure which:

- Promotes strategic planning, rather than reactive
- Facilitates short-term actions
- Guides decision making for longer term outcomes
- Builds in flexibility to respond to different possible futures

The resulting strategy is a living plan which sequences when, why and how to change course, based on monitoring the operating environment for triggers. The adaptive pathways plan engages promotes decision-making in a clear and readily understood format.

Pathways

Considering future uncertainties, such as demand management, climate change impacts and external actors, four developmental pathways were explored to test the merits of potential system configurations and their ability to perform in future scenarios. Each pathway represents increasingly centralised water supply as illustrated in Table 3, noting that they apply only for the Mary Valley and coastal schemes.

Alternative configurations were not explored for Goomeri and Kilkivan due to the cost-prohibitive distances involved.

Transfer pipelines, pump stations, reservoirs and redosing stations are also required to enable the centralised treatment proposed under each pathway:

- Pathway 0 maintains the existing supply approach with separate supply arrangements at each of the eight towns
- Mary Valley Pathway 1 includes an Imbil-Kandanga-Amamoor pipeline
- Coastal Pathway 1 includes a Cooloola Cove-Rainbow Beach pipeline
- Mary Valley Pathway 2 includes a Gympie-Kandanga-Amamoor-Imbil pipeline
- Pathway 3 includes the above, as well as a bi-directional pipeline between Gympie and Cooloola Cove

Table 3 Developmental pathways

Sub-region	Scheme	Pathway			
		0: Base case	1: Local combined	2: Greater connectivity	3: Regional scheme
Mary Valley schemes	Gympie	●	●	⊙	⊙
	Imbil	●	⊙	×	×
	Amamoor	●	×	×	×
	Kandanga	●	×	×	×
Western schemes	Goomeri	●			
	Kilkivan	●			
Coastal schemes	Cooloola Cove / Tin Can Bay	●	⊙		⊙
	Rainbow Beach	●	×		×

The symbols used in the table indicate:

- Individual scheme WTP (maintain existing configuration) + storage
- ⊙ WTP capacity upgraded to supply adjacent communities + larger storage
- × WTP decommissioned, with water supplied from adjacent upgraded WTP

Hydrological assessment

Hydrological assessment of the current system, and the four developmental pathways, was undertaken to test current and future system configurations. The assessment was based on stochastic modelling of a 10,000 year climate sequence. The assessment determined the current shortfall risks summarised in Table 1, and the size of storages required to meet LoS targets with projected 2050 demands. Key findings from the assessment were that:

- Run of river extraction, without storage, would not be adequate to meet the desired LoS target.
- Placing an off-stream storage (OSS) at Gympie would provide the most benefit in terms of catchment contribution.
- Using the new Borumba Dam (Borumba PHES) for additional GRC urban water storage has been tested as an alternative to an OSS at Gympie. The impact on power generation is estimated to be less than 1% reduction in the proportion of time that the scheme could operate at full generation capacity. An estimated 1m height increase to the proposed dam wall would maintain PHES generation outcomes while providing the 4000 ML/a as high priority (HP) supply.

Options definition

Options for each pathway were developed by conducting investigations, including:

- Hydrologic modelling to size each OSS for a 1 in 1,000 year ARI shortfall risk, with preliminary modelling to test requirements for a 1 in 10,000 year ARI shortfall risk - double the storage would be required to meet a 1 in 10,000 year ARI shortfall risk target
- Concept design based on hydraulic modelling and capacity assessments to determine transfer infrastructure requirements
- Condition assessments and site visits for water treatment plants and reservoirs.

Multi-criteria analysis

The developmental pathways have been assessed through a multi-criteria analysis (MCA) which takes into account GRC’s values and desired outcomes across community, environment, economics and organisational aspirations, structured around themes and outcomes drawn from the *GRC Corporate Plan 2022-2027*. The performance measures (the MCA criteria) have been cross referenced against GRC’s Customer Service Standard.

The MCA criteria have been scored on a scale of 1 to 5 for each pathway, with weightings established from the relationship mapping and defined relative importance of outcomes.

The assessment outcomes with regard to performance measures are summarised in Figure 1, which shows that:

- Within the Mary Valley, supplying all schemes from Gympie (Pathway 2) is the most beneficial due to better environmental, LoS, and operational impacts. Capital costs were within 3% of the base case (effectively a negligible difference).
- For the coastal schemes, leaving the two schemes decentralised (Pathway 0) is more beneficial overall. Supplying Rainbow Beach from Cooloola Cove did not provide sufficient non-economic benefit to justify the cost (nearly triple the base case), and increased construction risk.
- The two most beneficial pathways for the respective areas are further compared to the regional scheme (Pathway 3), including a bi-directional pipeline between Gympie and Cooloola Cove. The results indicate that the hybrid solution, where Gympie supplies all Mary Valley schemes (Pathway 2), while the coastal schemes continue under the existing arrangement (Pathway 0), would provide the most benefit.

No assessment was undertaken for the western schemes, for which no alternative to the existing arrangements was developed.

The preferred option, based on the outcomes of the MCA, includes:

- Centralised treatment for Gympie and the Mary Valley towns at Gympie (Pathway 2).
- Continuing the existing separate supply arrangement for the remaining schemes (Pathway 0).

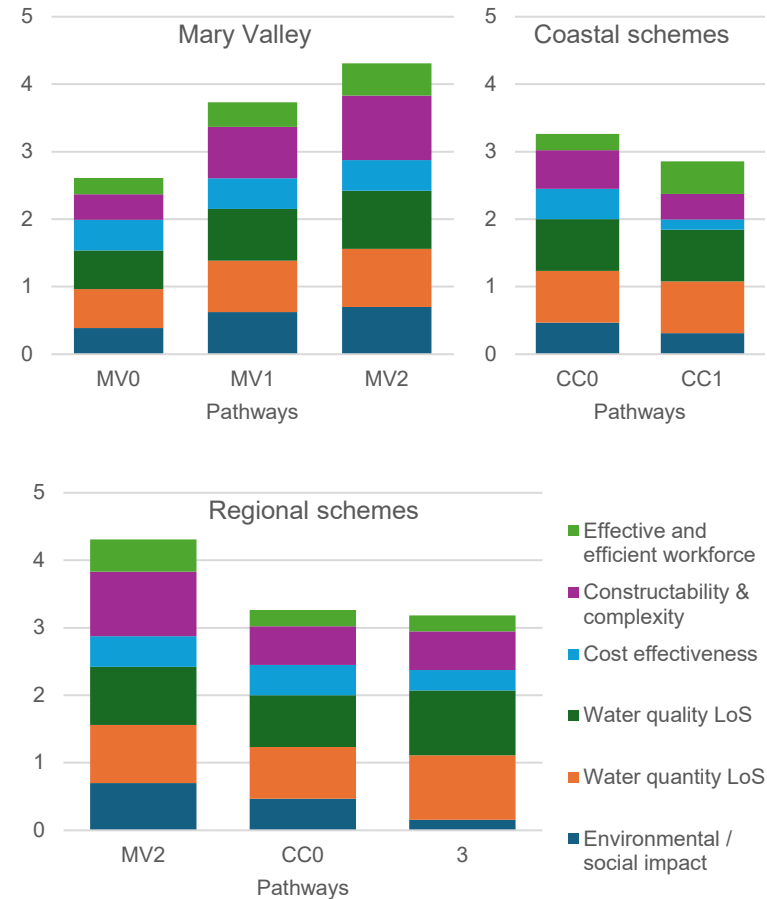
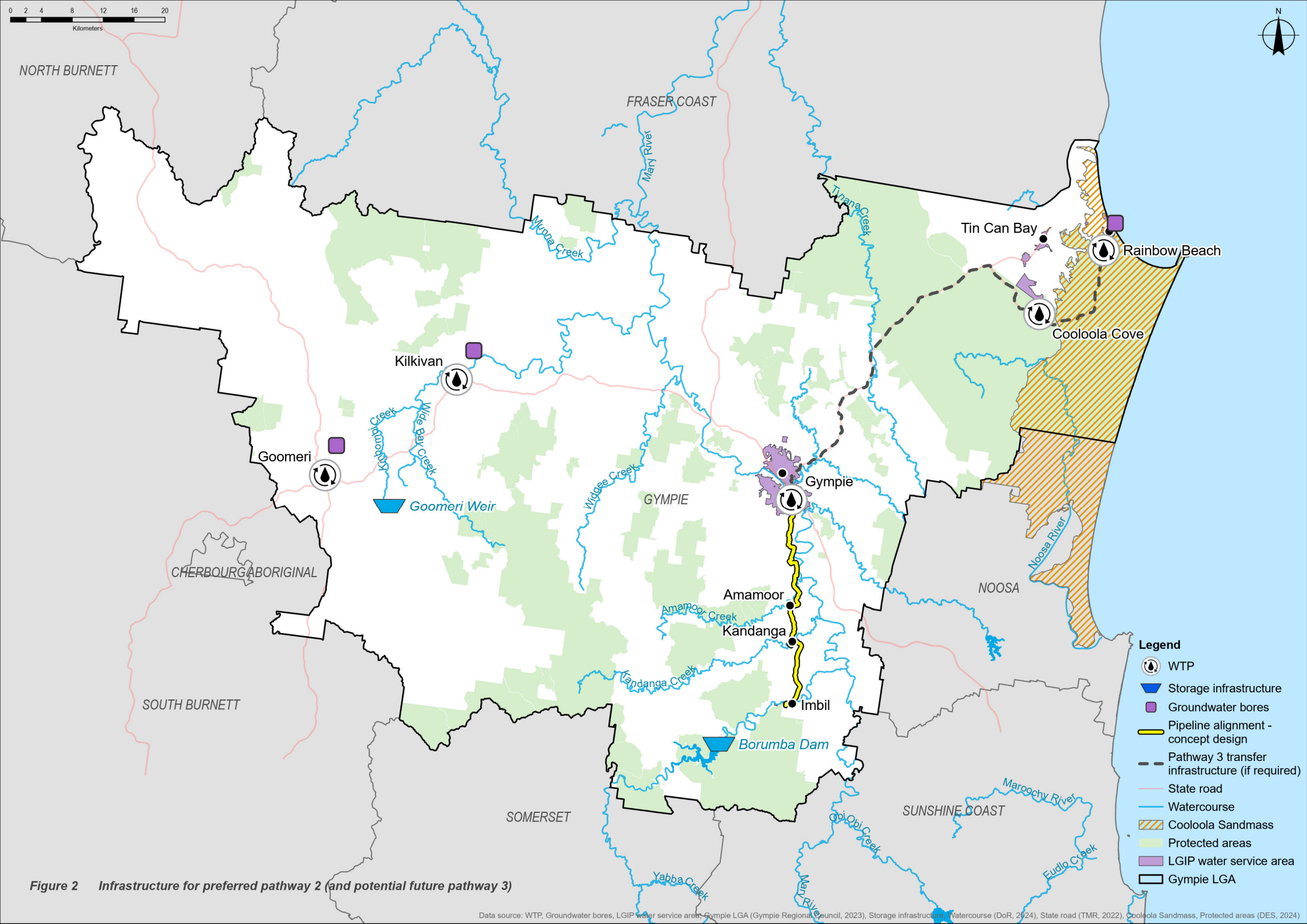


Figure 1 MCA assessment outcomes – by performance measure

The key elements of the proposed bulk water supply infrastructure for the preferred pathway are depicted in Figure 2.

The plan keeps the option open to develop a regional scheme connecting Gympie and Cooloola Cove (Pathway 3). It is included in Figure 2. for reconsideration during WSS reviews to assess its future suitability.



NORTH BURNETT

FRASER COAST

SOUTH BURNETT

GYMPIE

Tin Can Bay

Rainbow Beach

Cooloola Cove

Goomeri

Kilkivan

Gympie

NOOSA

CHERBOURG ABORIGINAL

Amamoor

Kandanga

Imbil

SOMERSET

SUNSHINE COAST

Legend

- WTP
- Storage infrastructure
- Groundwater bores
- Pipeline alignment - concept design
- Pathway 3 transfer infrastructure (if required)
- State road
- Watercourse
- Cooloola Sandmass
- Protected areas
- LGIP water service area
- Gympie LGA

Figure 2 Infrastructure for preferred pathway 2 (and potential future pathway 3)

Data source: WTP, Groundwater bores, LGIP water service area, Gympie LGA (Gympie Regional Council, 2023), Storage infrastructure, Watercourse (DoR, 2024), State road (TMR, 2022), Cooloola Sandmass, Protected areas (DES, 2024)

Water security outcomes

The preferred pathway identified in Figure 2 will provide GRC with an approach to improve water security for the existing Gympie Regional Council water supply schemes. Of significance, supply reliability for the Mary Valley should see an improvement once access arrangements for the strategic reserve (via OSS or Borumba Dam), new Gympie WTP and the Mary Valley pipeline is commissioned (Figure 3). All Mary Valley schemes will fall under the risk of supply shortfall at Gympie once implemented.

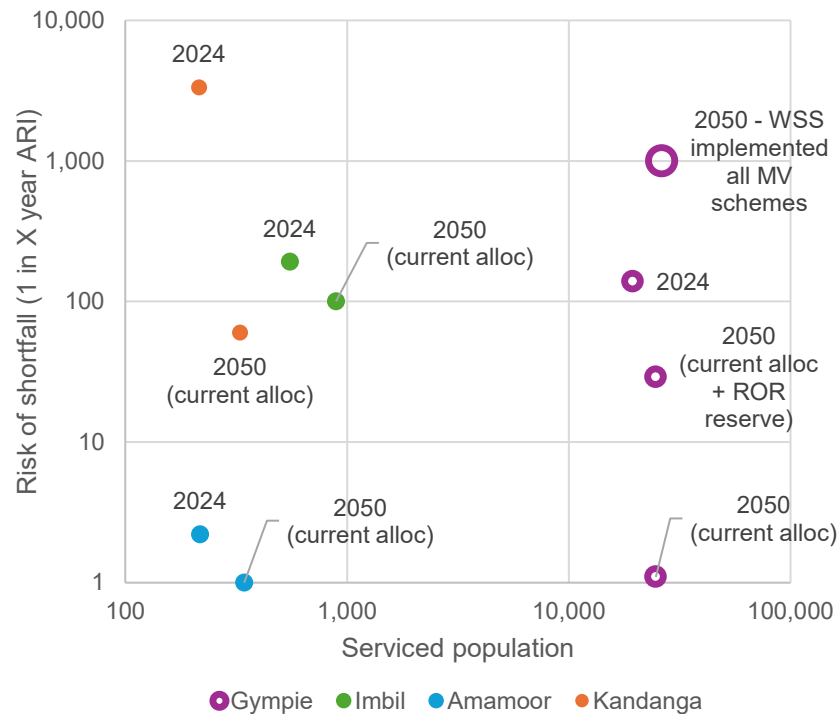


Figure 3 Improvement to supply reliability achieved from WSS implementation

These improvements, along with other improvements to water security are summarised for each sub-region below.

Mary Valley schemes:

1. When the Mary Valley pipeline is constructed, the hydrologic modelling indicates that the shortfall risk in Amamoor should improve to near 1 in 100 year ARI. The (potential) WTP capacity shortfall in Imbil and the high THM challenges faced at Imbil, Kandanga, and Amamoor should be resolved. A reliability concern remains at Jones Hill WTP, given the critical risk of its aging assets.
2. The hydrologic modelling shows once the 4,000 ML/a strategic reserve is accessed and stored in an OSS or Borumba Dam, shortfall risk should improve to 1 in 1,000 year ARI. This security is applicable across all of the Mary Valley due to the new pipeline.
3. When a new (or upgraded) Gympie WTP is commissioned improved process reliability (including HBTs) can be achieved.
4. As all other schemes rely on Gympie for water carting for emergency supply, the above solutions can benefit the entire region. Even so, targeted upgrades in the western and coastal schemes are recommended to improve security and reduce likelihood of water carting from Gympie.

Western schemes

1. With the construction of treated water storage in Goomeri, process reliability will improve, allowing operators valuable time to minimise supply interruptions without impacting customers.
2. Several WTP upgrades will help to improve process reliability and supply shortfall risk, including upgrades to treat more groundwater at Goomeri and achieve ADWG HBTs.
3. Goomeri should see an improvement in shortfall risk with upgrades to the Kinbombi Ponds. The extent of this improvement needs to be established through further investigation and feasibility studies.

Coastal schemes:

1. Upgrading current treated water storage in Rainbow Beach will improve process reliability by introducing more storage to alleviate high peak demands (e.g. tourism).
2. Upgrades at Cooloola Cove WTP will improve process reliability by introducing redundancy to source water extraction.

Emergency water supply arrangements

Emergency water supply is called upon as a temporary measure to supply a highly restricted demand (i.e. Level 5), in the event of an extreme drought or service interruption due to other causes such as failure of key assets. This is distinct from contingency supply, which augments 'normal' supply, either temporarily or permanently.

While the WSS recommended pathways are intended to reduce the risk of water supply shortfall to 1 in 1,000 years ARI, it is anticipated that these measures will take some time to implement (up to 2032). Therefore, the contingency and emergency water supply arrangements are a crucial aspect for water supply security in the interim period.

Longer term, the crucial arrangement will be to increase the reliability of water supply to Gympie as it:

- Is too large to effectively supply Gympie via tankering
- Will enable Gympie to function as the emergency water supply for all the serviced communities

Almost all the communities in the region ultimately rely on Gympie as the water source in emergency. Due to the distances and the size of communities involved, tankering is more cost effective than transfer pipelines. Tankering can be triggered when Level 5 conditions are imminent, as water carting does not require significant lead time for implementation, assuming that 'first preference' contract arrangements with tankering providers are in place.

A hierarchy of response to emergency conditions has been developed for each serviced community. Further discussion of the supply options for the Region is provided in Table 4.

Table 4 Contingency and emergency supply recommendations

Sub-region	Scheme	Contingency supply options	Emergency supply
Mary Valley schemes	Gympie	Run of river extraction (during interim period), obtain additional allocation, develop recycled water and/or an OSS at Gympie	Transfer water via pipeline from SEQ Water Grid
	Imbil	No recommendation	Carting from Gympie, or temporary mobile water treatment (only for peak demands)
	Amamoor	No recommendation	Carting from Gympie
	Kandanga	No recommendation	Carting from Gympie
Western schemes	Goomeri	Upgrade WTP and storages, investigate groundwater yields to consider additional bores	Carting from Gympie or South Burnett
	Kilkivan	Investigate groundwater yields to consider additional bores	Carting from Gympie
Coastal schemes	Cooloola Cove / Tin Can Bay	No recommendation	Carting from Rainbow Beach or Gympie
	Rainbow Beach	No recommendation	Carting from Cooloola Cove or Gympie

The solutions noted below are contingent water supplies which would assist to delay any need for an emergency water supply.

1. **Agree to temporary arrangements with the regulator for additional run-of-river extraction**, in the period up until formalisation of access to the additional 4,000 ML/a assigned to GRC under the new Water Plan. The run-of-river approach has an assessed shortfall risk of 1 in 29.
2. **Obtain additional allocation** from Seqwater, Nestlé or others – this largely applies to the period before final arrangements have been implemented regarding Borumba Dam or an OSS, noting that when Borumba Dam is low, MP is likely to be restricted or suspended.
3. **Develop recycled water** at Gympie (to 1,500 ML/a) – this could offset potable water use in open spaces, be traded for MP allocations, or injected into groundwater, depending on hydrogeological suitability.

The preferred emergency water supply solution for Gympie is currently a pipeline transferring water from the SEQ Water Grid, which includes climate independent water sources such as recycled water and desalinated sea water– this should be confirmed through further investigations and discussions with Seqwater to agree to conditions around emergency supply. The quantity supplied under the arrangement should consider the requirements of not only Gympie, but also the supported communities (all eight towns) at Level 3, 4 and 5 restrictions. This solution is considered more plausible than GRC developing its own desalination plant and pipeline. Supply to Gympie from the Cooloola Sand Mass Aquifer was considered, however spare GRC allocation from the aquifer would only be sufficient for Level 4 restricted demand in 2050. Due to regulatory complexity and the constrained supply, this was not explored further.

Due to the lead time required for negotiating an agreement, securing funding commitments, planning, design and construction, there is no specific trigger from current conditions other than a desire for additional security. Hydrologic modelling shows that the existing Borumba Dam could take as little as 1.5 years for water reserves to reduce from near full (99%) to less than 5%.

¹ Supply via Borumba Dam or OSS. If OSS required, undertake siting study, environmental, geotechnical, sustainability & social impact studies, followed by design & approvals

Implementation roadmap

The implementation roadmap unifies steps towards achieving the preferred pathway while maintaining flexibility to adapt to future uncertainty. Major elements of the implementation roadmap are listed in Table 5.

Table 5 Implementation roadmap in summary

Sub-region	Actions
Mary Valley schemes	<ul style="list-style-type: none"> Confirm arrangements to access additional 4,000 ML/a reserve¹ Interim upgrades to Amamoor, Kandanga and Imbil WTPs Negotiation with QLD Hydro for early construction of the MV pipeline to supply Borumba PHES needs Feasibility study & design – upgrade or new Gympie WTP, MV pipeline Construction of MV pipeline (incl. decommissioning small plants) Construction of Gympie WTP
Western schemes	<ul style="list-style-type: none"> Feasibility study, design, and construction – Goomeri & Kilkivan upgrades Minor studies to confirm WTP capacities and groundwater reliability Implement regular monitoring of groundwater, surface water sources
Coastal schemes	<ul style="list-style-type: none"> Feasibility study, design, and construction – Rainbow Beach and Cooloola Cove upgrades Minor studies to confirm WTP capacities Implement further monitoring of groundwater source
All schemes	<ul style="list-style-type: none"> Negotiate for funding support Initiate demand management plan – consumption, NRW water reduction Undertake discussions with LGWV and Seqwater to develop viable emergency response water source options On-going monitoring of water supply security and reliability, reviewing at least every 5 years



ghd.com

→ **The Power of Commitment**