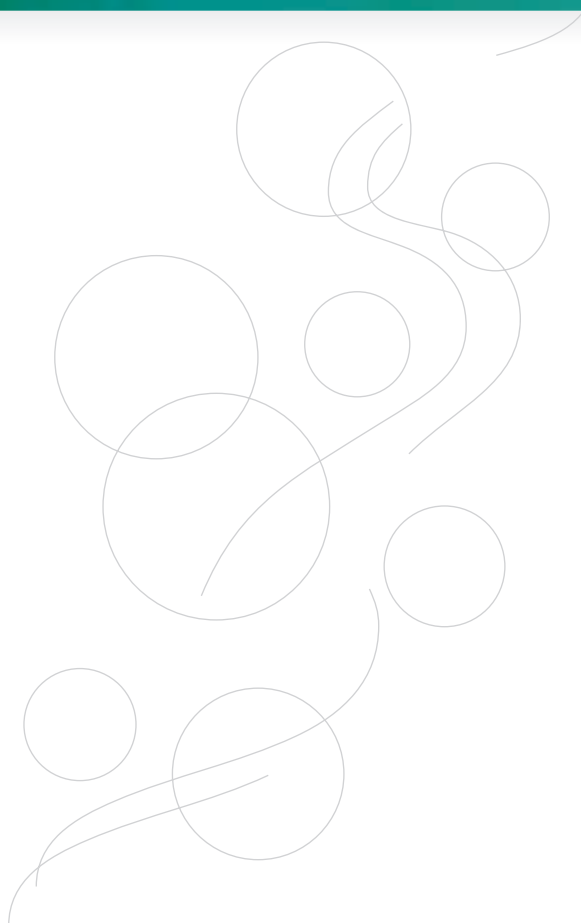




December 2006

Central Queensland

Regional water supply strategy



Queensland
Government

Queensland **the Smart State**

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Foreword

Secure, cost-effective water supplies underpin the lifestyle and prosperity all of us enjoy, no more so than in Central Queensland, one of the state's key growth regions. The regional economy and the many communities that are its backbone will continue to rely on adequate supplies of our most precious resource as a period of new opportunities unfolds.

Forward planning will play a paramount role in ensuring that secure water resources are available where and when they are needed, so that the regional community shares in the many gains that will be made. Advances will be led by expansion in the mining, industrial and agricultural sectors, confirming Central Queensland's place as a key contributor to the state's economy.

Particular challenges include the distances between urban centres, the apparent declining trends in rainfall and, in some areas, high competition for water supplies.

The Queensland Government, local government, industry, Indigenous and community representatives have worked closely to address the future water needs of Central Queensland. Through this partnership, the Central Queensland Regional Water Supply Strategy has sought to identify the most effective ways of equitably meeting the region's water supply challenges.

The mechanisms proposed to meet these challenges include new pipelines to link key water infrastructure within and outside the region to areas of greatest need. In this way, a regional water grid will be established, forming a first step towards a statewide water grid.

Key water infrastructure, which would form part of a statewide water grid, is located in and around the area covered by the Central Queensland Regional Water Supply Strategy. The Queensland Government has already committed to:

- raising Eden Bann Weir in the Fitzroy and Livingstone Shires
- constructing Rookwood Weir in the Fitzroy Shire
- developing the Connors River Dam in the Broadsound Shire
- undertaking design work on, and construction of, the Nathan Dam in the Taroom Shire (subject to obtaining Commonwealth approval under the *Environmental Protection and Biodiversity Conservation Act 1999*)
- pipelines to connect the new Connors River Dam with Broadsound and possibly Nebo and Belyando Shires
- pipelines to connect Rockhampton to Gladstone
- a pipeline for the Capricorn Coast connecting Rockhampton to Yeppoon
- a pipeline from the Burdekin River to Moranbah with potential other extensions.

New water infrastructure proposed for other areas of Queensland will be reflected in regional water supply strategies to be prepared for South East Queensland, Wide Bay Burnett, Mackay Whitsunday, Cairns Atherton Tablelands and Far North Queensland.

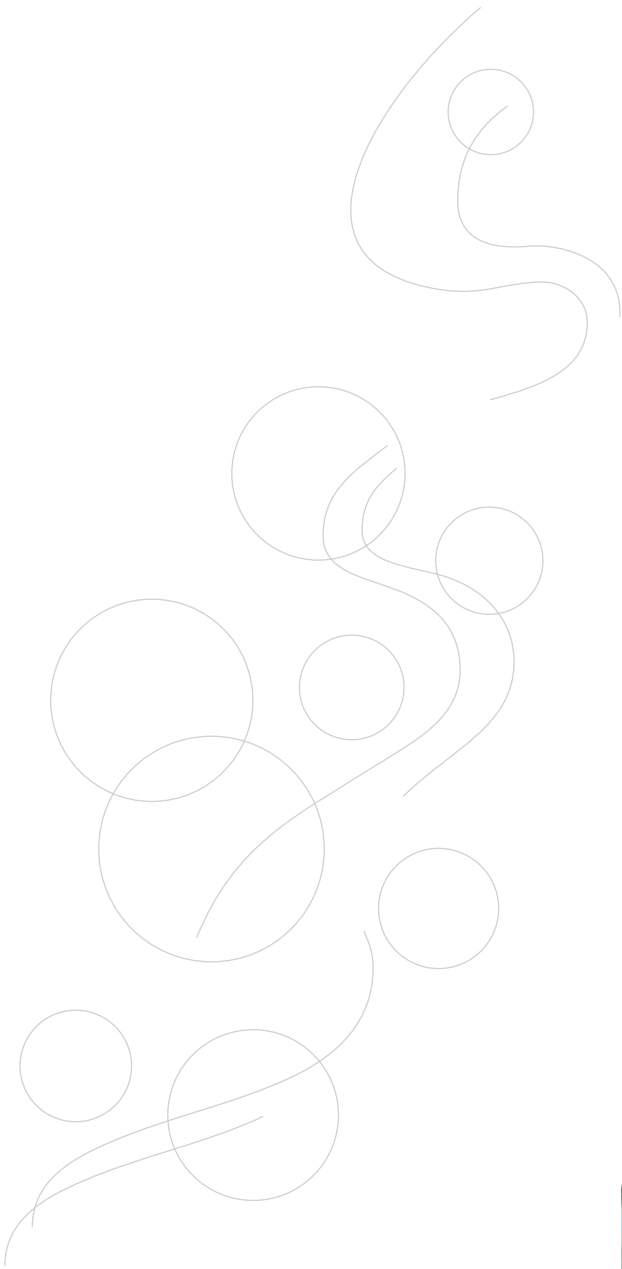
The strategy demonstrates the government's commitment to securing the region's future water supply, which is vital to its prosperity.

Hon Craig Wallace MP
Minister for Natural Resources and Water and
Minister Assisting the Premier in North Queensland

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1. Introduction



Introduction

Secure, sustainable water supplies are integral to our way of life and continued growth and prosperity. For Queensland, particularly in times of drought, this presents a special challenge, and as we mature as a state, the need for careful forward planning and management of our water resources is becoming paramount.

Regional water supply planning is emerging as one of the most important tools at our disposal for ensuring that supplies are equitably shared in a way that brings the broadest community benefit, including providing protection for the natural ecosystems of the region. It allows us to match supply with growth and opportunity, reinforcing social, cultural and economic linkages that bind a region as a whole. While in the past, water supply planning has principally occurred at a local level, the case for regionally based strategies is gathering weight as we address the challenges of increasing growth, resource scarcity, and the need to protect natural ecosystems.

This strategy presents the preferred options for water supply, as developed through the Central Queensland Regional Water Supply Study.

The finite nature of our fresh water supplies does not necessarily equate to limited economic growth or environmental degradation. Rather, the fact that water resources are scarce and often highly variable means that water, like other limited inputs to economic production, needs to be used efficiently and allocated to its highest value uses in order to improve both economic and environmental outcomes.

1.1 Background to the strategy

The National Water Initiative Agreement, which commits Queensland to work with the Commonwealth and other states and territories to progress national water reforms, was signed in June 2004.

Local government has a statutory role in the planning, management and day to day delivery of water to urban communities.

Implementation of water reforms by state and local government has been underway in Central Queensland for a number of years and has provided many users with a more secure water entitlement.

A water resource plan (WRP) was developed for the Fitzroy Basin in December 1999. The WRP provides a balance between environmental needs and consumptive use. The overview report to the WRP identified water potentially available for allocation, pending further investigations.

The resource operations plan (ROP) for the Fitzroy Basin, released in January 2004, acknowledged that the final determination of the quantities of unallocated water available for release in different catchments would be subject to the completion of a WRP amendment to include overland flow water and a Central Queensland Regional Water Supply Study.

Development of the Central Queensland Regional Water Supply Strategy (the strategy) was initiated through the Central Queensland Regional Water Supply Study (the study). Primary drivers for the study included:

- urban and industrial growth around the Capricorn and Curtis coasts
- mining and associated urban growth in the Bowen Basin and northern Surat coalfields
- performance of existing supply schemes in combination with dry conditions in recent years
- a call by local government to chart a cooperative approach towards the development of a long-term strategy for meeting the water needs of the region.

A Central Queensland Regional Water Forum was held in Yeppoon in May 2003. It provided an opportunity for local government and other stakeholders to identify and discuss key water supply issues, challenges and priorities and to provide initial input into the study. Discussions at this forum had a significant influence on the directions of the study.

The study assessed current water availability and future demands, and how they could best be met whilst at the same time protecting the natural values and ecosystems of the region.

The study involved:

- identification of the short, medium and long-term water supply aspirations for urban, rural and industrial communities
- review of the potential for measures such as water trading, demand management practices, efficiency gains, water reuse, substitution and desalination to meet the projected supply needs
- comparative assessment of potential infrastructure options to meet shortfalls, using environmental, social and economic criteria
- development of an integrated regional water supply strategy to optimise use of the available resources.

The study's findings have been refined to create a water supply strategy for the region that proposes a framework for sharing supplies into the future.

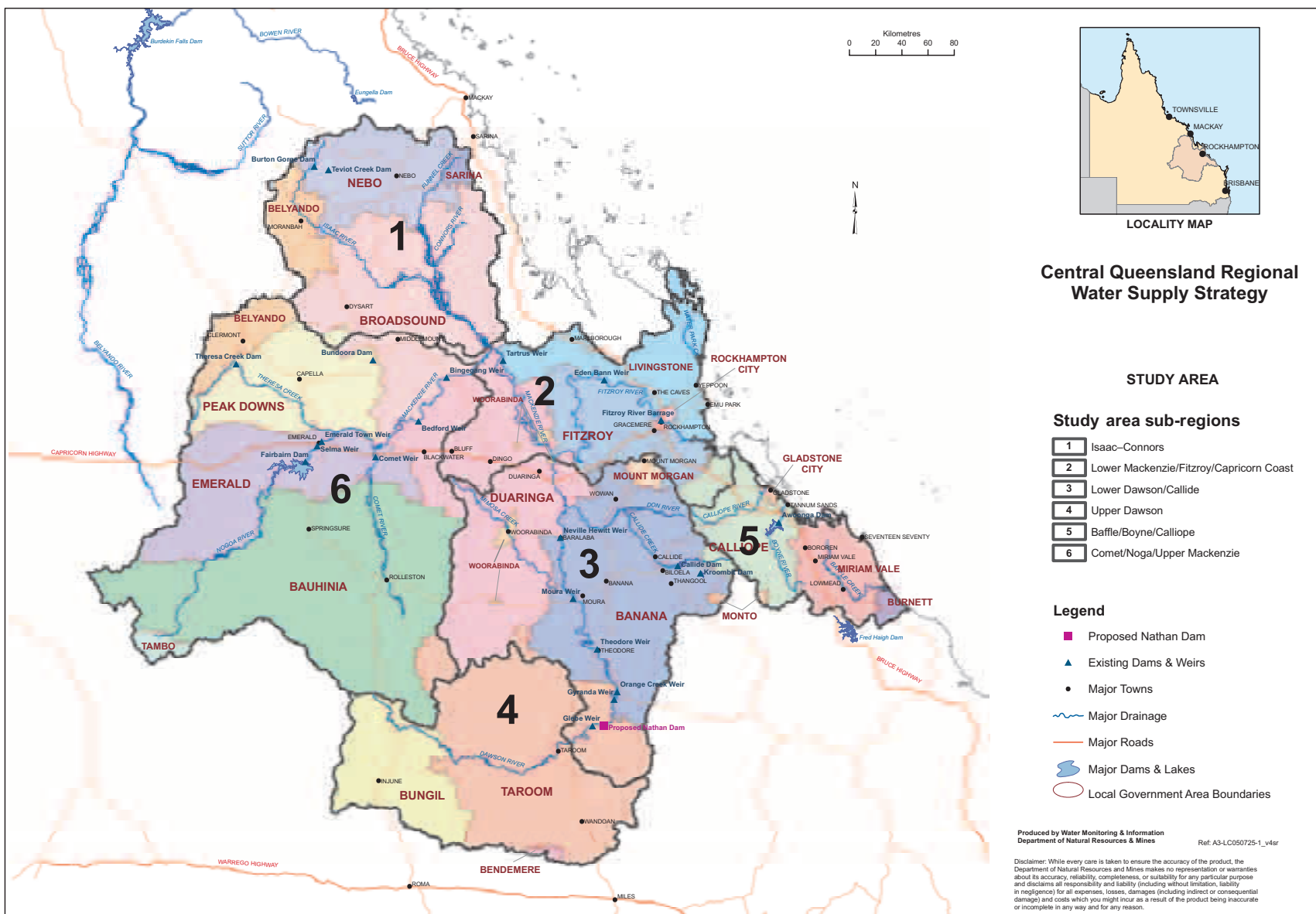
1.2 Where is the strategy area?

The strategy area, covering about 153 000 square kilometres, includes Queensland's Fitzroy River Basin and the coastal streams of the Capricorn Coast and the Gladstone region (Figure 1).

For the purposes of the strategy the area was divided into the following six sub-regions, shown in Figure 1:

1. Isaac–Connors River system
2. Lower Mackenzie–Fitzroy River system, including Water Park Creek/Sandy Creek
3. Dawson–Callide River system (below Taroom) including the Dawson, Don and Dee Rivers and Callide Creek
4. Upper Dawson River system (above Taroom)
5. Boyne–Calliope River systems and Baffle Creek system
6. Comet–Nogoa–Upper Mackenzie River system.

Figure 1: Study area



1.3 Why do we need a strategy?

The Central Queensland Regional Water Supply Study was initiated in response to prolonged severe drought in Central Queensland, from which it became evident that a regional, whole-of-government approach was the most efficient way of meeting the water supply challenges.

A strategy was needed to address the following key issues:

- Urban growth and industrial development is continuing, particularly in the Lower Fitzroy and Gladstone areas, and mining development in the Bowen and Surat Coal Basins.
- Entitlements in some existing water supply systems in the region are at or approaching full usage.
- Some existing water supply schemes are performing below water users' requirements.
- Based on projections of water demands to meet urban, industrial, coal mining and agriculture requirements from 2005–20, supply shortfalls are predicted throughout much of the region.

Without a long term strategy to address future water supply issues in Central Queensland:

- further water restrictions may be needed to maintain adequate levels of water supply services
- industrial, urban and agricultural expansion and new development will be limited, affecting the economic prosperity of the region.

1.4 What is the strategy?

The strategy is an adaptive long-term statement, outlining equitable and timely solutions to the urban, industrial/mining and agricultural water needs of the Central Queensland region. Through a coordinated, regional approach, the strategy has been tailored to achieve optimum social, environmental and economic outcomes for the region.

Sustainable allocation and best use of water will be reached by adopting a hierarchy of three key principles:

- Facilitating the highest value and best use of water through trading of existing secure and well specified water entitlements.
- Promoting efficient use of water. For example, by improving demand management and by recycling water.
- Where demands cannot be met through the above measures, and where unallocated water is available, by the development of additional water supply sources.

The strategy provides the basis for water supply planning over the next 15 years and beyond.

Together, the elements of the strategy will provide a basis for allocating and managing the regions' water resources—and for planning for infrastructure developments—for the next 15 years and beyond.

The strategy is intended to be a flexible document that will be monitored and reviewed to ensure it remains relevant in the years ahead.

The strategy identifies a mix of options for meeting future water demands, including water trading, improved water use efficiency and reuse and potential additional water infrastructure supply sources. The first two elements are largely concerned with optimising potential gains from within the existing water resource base. The third element addresses the supply needs that are not likely to be met from the first two.

Assessments of the infrastructure options have been conducted at a pre-feasibility level and should not be regarded as formal impact assessments or as the government's endorsement of particular projects. It is expected that any potential infrastructure options identified would be progressed at the appropriate time on a commercial basis as is provided for in the *Queensland Government Guidelines for Financial and Economic Evaluation of New Water Infrastructure in Queensland* and the *Water and Sewerage Program*.

The strategy also identifies volumes of water that can be made available in future for direct extraction, for example, through water harvesting entitlements.

If all of the proposed water supply options identified in this strategy are developed, the total volume of unallocated water available for release under the Fitzroy Basin Water Resource Plan would be fully allocated.

1.5 How was the strategy prepared?

Preparation of the strategy was a community/industry/government partnership. The Department of Natural Resources and Water (NRW) was the lead agency and project manager.

The strategy was developed under the following management arrangements:

- A steering committee comprising representatives from state government, local government, water service providers and key stakeholder bodies provided direction to the project team on the conduct of the study and development of a preferred strategy.
- A technical committee, comprising technical experts from state agencies, local government, water service providers, industry and community organisations provided technical review.
- A project team comprising officers from the Department of Natural Resources and Water, the Coordinator General (formerly part of the Department of State Development and Innovation), the Department of Primary Industries and Fisheries and the Environmental Protection Agency (EPA) was responsible for undertaking the study's components.

The steps in developing the strategy included:

1. identifying existing water use
2. estimating future short, medium and long-term water supply requirements
3. identifying shortfalls in existing supply systems to meet existing and future water requirements for each sector
4. identifying potential for making better use of existing supplies, for example, water trading, improved demand management measures and enhanced water reuse
5. identifying potential options for new water supply sources to meet shortfalls
6. preliminary evaluation of potential infrastructure options on the basis of economic, social and environmental criteria
7. combining measures identified in steps 4 and 6 above to provide a supply strategy for the region
8. assessing risks associated with the supply strategy
9. identifying actions required to implement the strategy.

The strategy has been prepared through a partnership process including state government agencies, local government, industry and community organisations.

1.6 Where does the strategy fit in the regional planning context?

There are a number of regional planning initiatives in the study region that provide a broader context for the strategy, including three plans prepared by Regional Planning Advisory Committees under the *Integrated Planning Act 1997*. These regional planning projects are, CQ A New Millennium; Wide Bay 2020; and Whitsunday Hinterland and Mackay.

These three regional growth management frameworks are endorsed as the principle long term integrated regional planning strategies for the areas concerned. As well as providing an overall vision for the region, the plans offer information and policy direction to all spheres of government and community sectors, and identify specific actions to guide planning and development across a range of resource areas.

Regionally significant topics covered in these plans include resource use, conservation and management; economic development; infrastructure and transport; social and cultural development; education, training and research; planning and governance and regional identity and leadership.

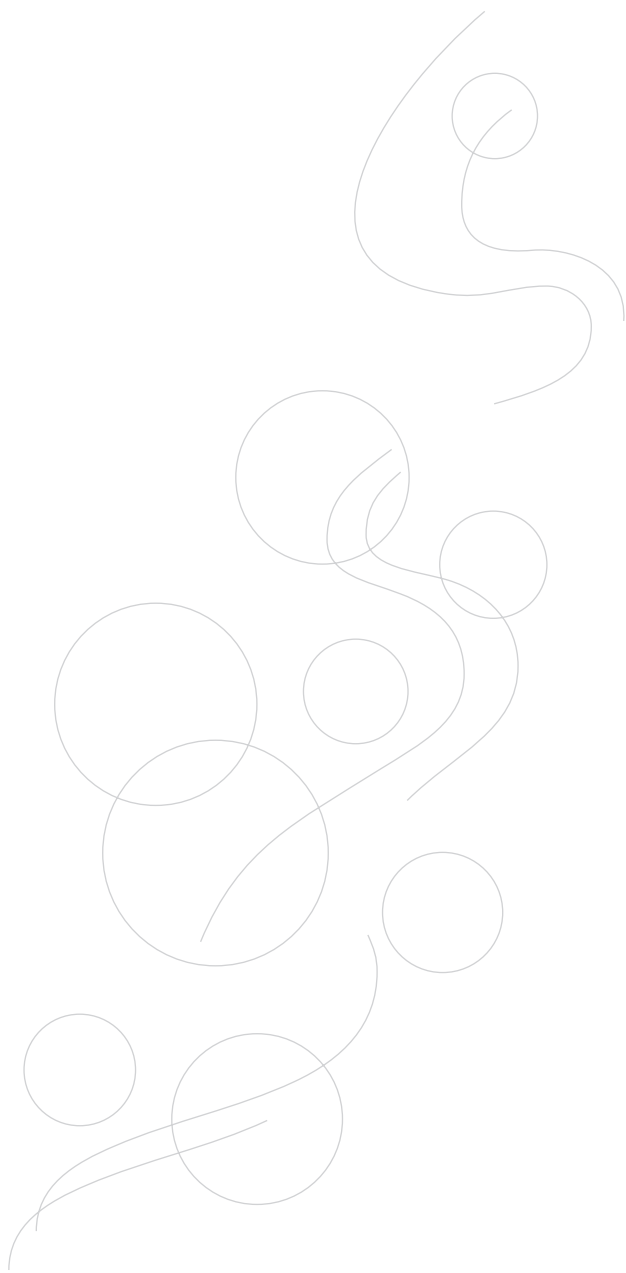
Other regional planning documents include the Gladstone Growth Management Initiative and the Curtis Coast Regional Coastal Management Plan established under the *Coastal Protection and Management Act 1995*.

Additionally, the acknowledged plan for the future management of natural resources in the region is the Strategy for Sustainability 2004 and Beyond 2nd edition produced by the Fitzroy Basin Association. The strategy provides a framework to address critical pressures on the region's natural resources.

The strategy has been developed having regard to the information, policies, strategies and actions that relate to the planning and management of the region's water resources contained in these regional plans. Further details relating to this regional planning context is provided in the Central Queensland Regional Water Supply Strategy – Study Report.

2. The Challenge

Will there be sufficient water?



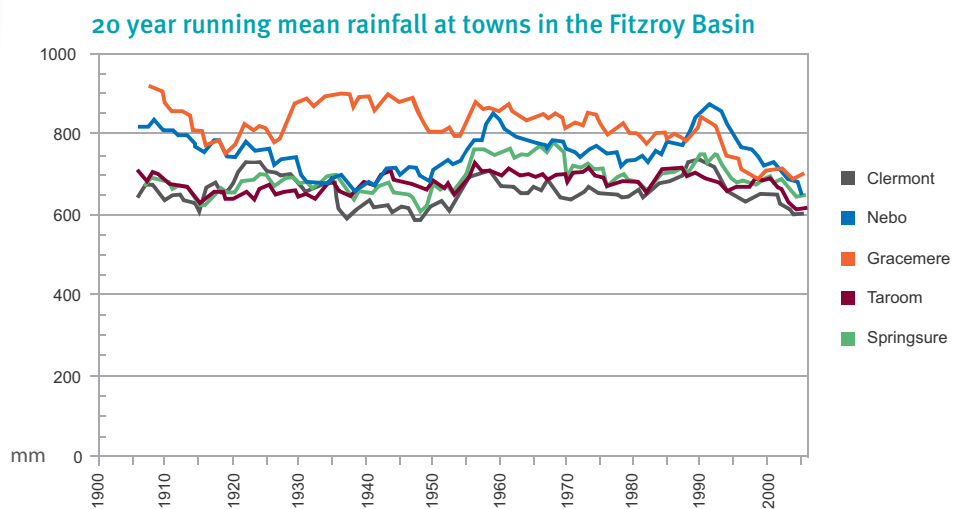
2.1 Overview of current situation

The first step in preparing the strategy was to consider the existing situation. Dry conditions in recent years have seen supply issues emerging in some of the area's major water supply schemes.

Central Queensland experiences a tropical to sub-tropical climate with warm to hot summers and mild dry winters. Rainfall, runoff and temperature are naturally highly variable and evaporation is high.

Climate variation and change is expected to have a major impact on our current water supplies and the planning of potential future water supply options. Figure 2 gives an indication of rainfall trends at various locations across Central Queensland since about 1900.

Figure 2: Mean rainfall at various locations in the Fitzroy Basin



The recent decline in rainfall in the region is associated with a decline in the number of tropical cyclones crossing the east coast and the consequent decrease in the number of days of high rainfall intensity.

There is also an increasing awareness of and desire to better match the performance of existing water supplies to their uses. Achievement of this goal requires improved water management, and in some cases, additional water sources.

For some communities, there is an additional challenge of balancing water supply and demand where competition for the scarce resource is strong.

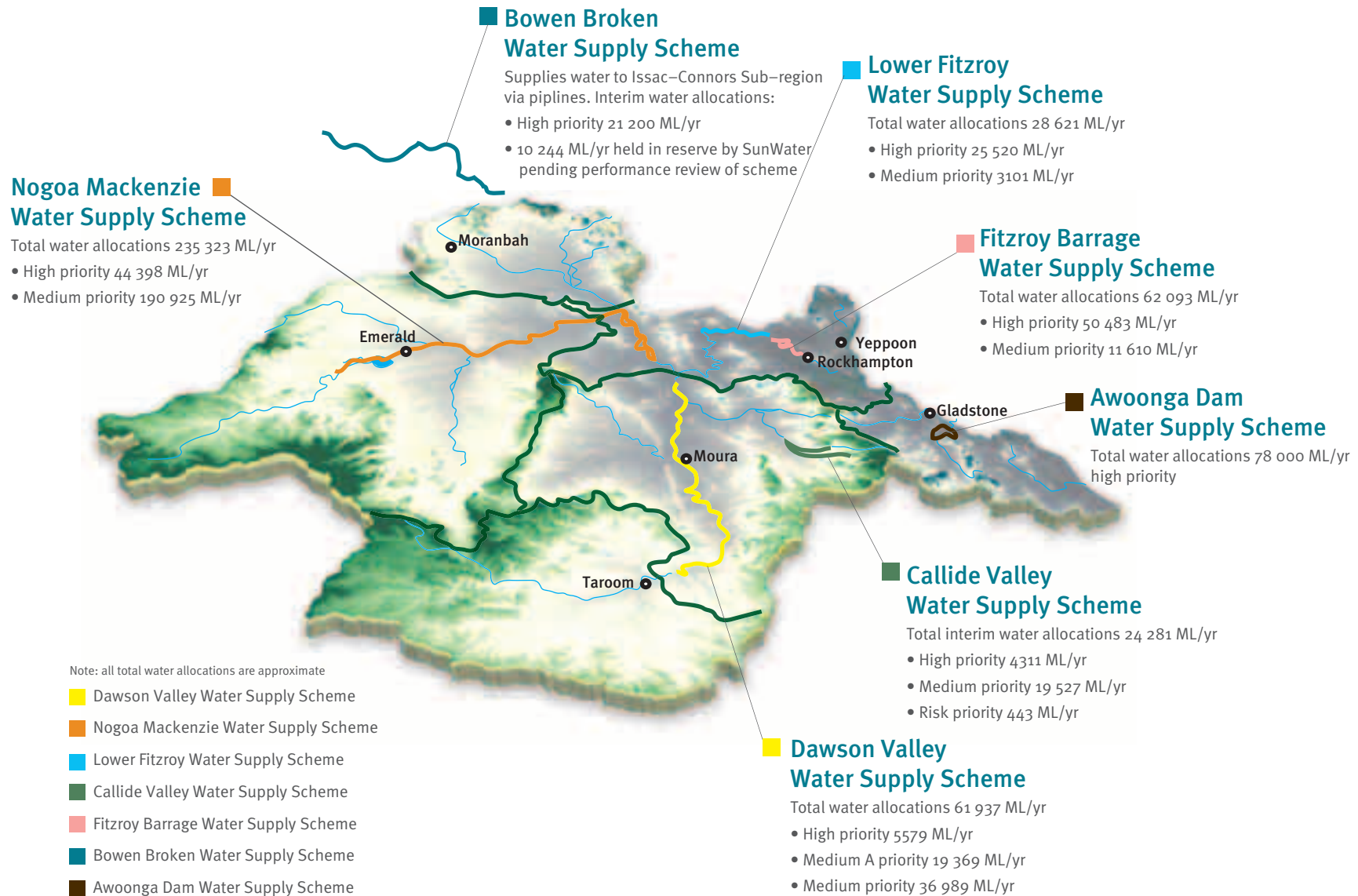
Another potential challenge is that communities may have also experienced changes in land use. A number of land use change activities, such as vegetation thickening and plantation development, have potential to intercept surface and/or groundwater now and in the future.

In line with the National Water Initiative framework, NRW will determine through water resource planning processes whether the volume intercepted through land use change is a 'significant' water use.

A fundamental understanding of the region's current water supply arrangements is essential in effectively considering how future supply arrangements might evolve. Figure 3 identifies the major water supply schemes.

In undertaking the study, data on current water use and population trends were gathered from the best available information sources and used to project future water needs. Where no information was available, the best estimates based on representative areas or groupings were utilised. To ensure that any changes in circumstances are considered and projections remain as accurate as practicable, projected water requirements will be reviewed and updated as part of the implementation process for the strategy (see Section 5).

Figure 3: Major water supply schemes and water allocations



2.1.1 Supply schemes and private diversions

Major water supply schemes

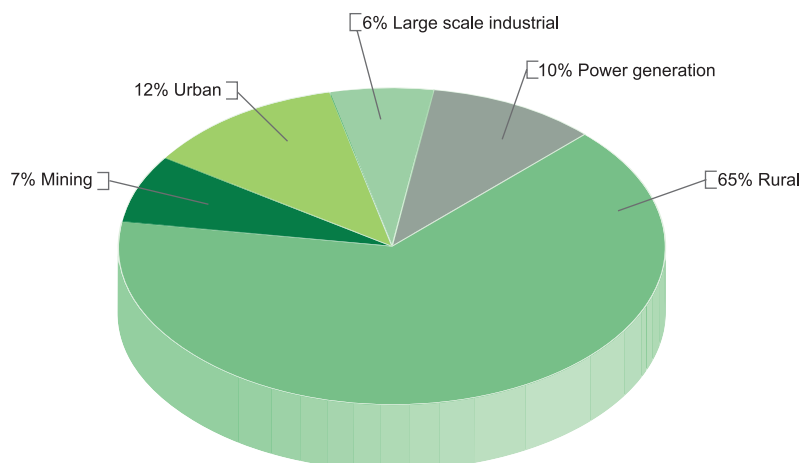
There are currently seven major water supply schemes (Figure 3) that provide supplemented water supplies within the strategy area:

1. Bowen Broken Water Supply Scheme operated by SunWater. This scheme has storages in the Burdekin River Basin and provides water to users (mainly mining) in the Isaac Connors sub-region via the BMA Eungella pipeline and EPC Eungella pipeline
2. Lower Fitzroy Water Supply Scheme operated by SunWater
3. Fitzroy Barrage Water Supply Scheme operated by Fitzroy River Water (FRW)
4. Dawson Valley Water Supply Scheme operated by SunWater
5. Callide Valley Water Supply Scheme operated by SunWater
6. Awoonga Dam Water Supply Scheme operated by the Gladstone Area Water Board (GAWB)
7. Nogo Mackenzie Water Supply Scheme operated by SunWater.

These schemes provide around 293 000 megalitres per annum (ML/a) of medium priority water entitlements and some 250 000 ML/a of high priority water entitlements to users in the study area. Combined, water delivered to users in 2003–04 was about 270 000 ML, with deliveries in some schemes significantly affected by drought.

Demand for this supplemented water is from the mining, industrial, urban and irrigation sectors. The approximate proportion of use by sector is illustrated in Figure 4. Use over the last 10 years peaked in 2001–02 with about 406 000 ML used, including 266 000 ML for irrigation.

Figure 4: Approximate break-up of water delivery by sector (predominantly 2002–03 data)



Factors currently impacting on the supplemented water supply to water users in the strategy area, include:

- the full utilisation of available water entitlements in existing schemes, in particular, the Nogoia Mackenzie Water Supply Scheme, Dawson Valley Water Supply Scheme and Lower Fitzroy Water Supply Scheme
- the performance of some of the major water supply schemes is below what is required by the water users dependent on them.

Other water supply schemes

- **Town water supplies**

There are about 50 town water supply schemes operated by 18 local governments (registered Service Providers under the *Water Act 2000*) servicing the urban water requirements for a population of about 178 000. Water for many of these schemes is drawn from the major schemes listed earlier. The remaining schemes draw additional supplies from other surface and groundwater sources. Urban use currently totals about 63 000 ML/a, the majority of which is drawn from the major supply schemes.

- **Mine and mining town water supplies**

There is a large network of water supply infrastructure (including over 1000 km of pipelines) comprising some 16 schemes servicing the water needs of the 23 Bowen and Callide Basin coal mines and six associated towns in the study area. The majority of these schemes are privately owned and operated by the mining companies. The primary water use at the mines is for coal handling and preparation. Total water use is currently about 38 500 ML/a.

- **Rural water supplies**

Statutory water boards (Category 2 Water Authorities and registered (small) Service Providers) operate seven small rural schemes that supply water for stock and domestic purposes. Total water use in these schemes is currently about 300 ML/a.

Other water supplies

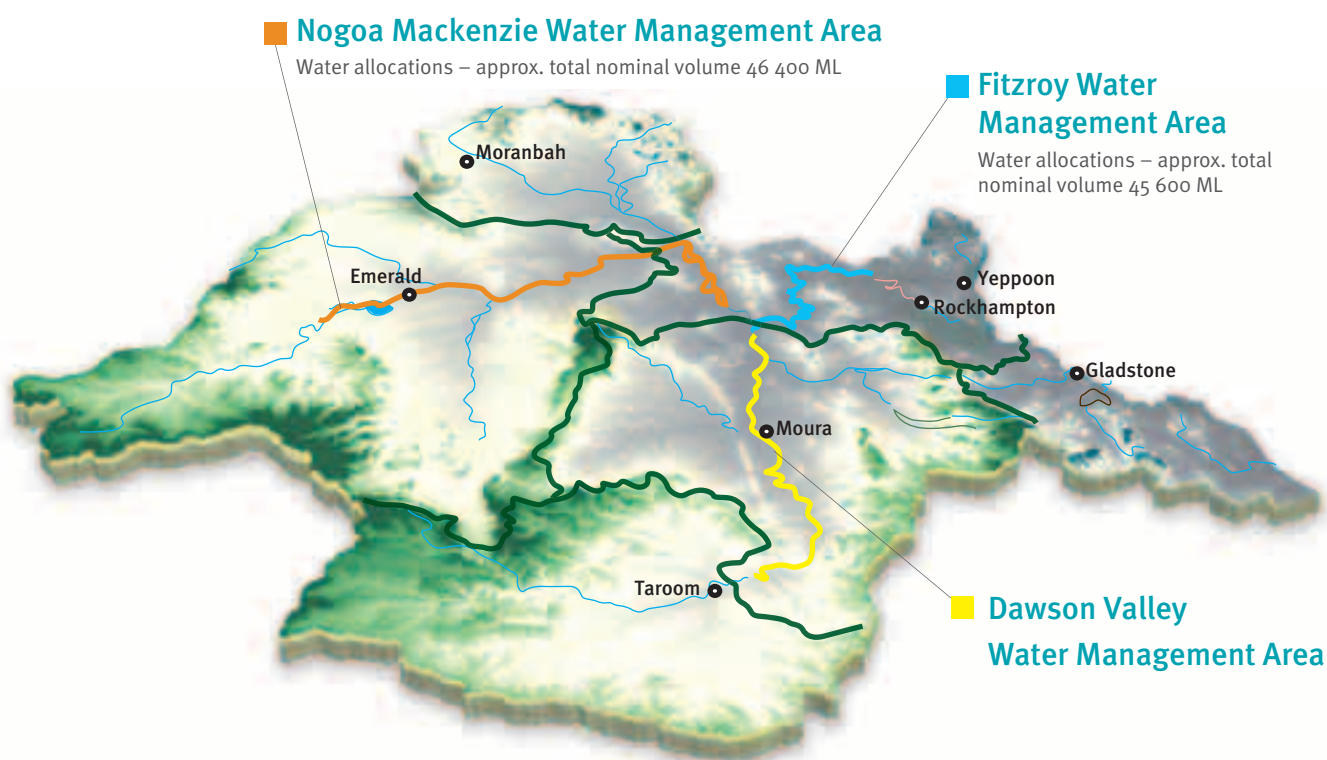
- **Unsupplemented surface supplies**

In the region, a large number of water users draw unsupplemented supplies direct from streams. Unsupplemented entitlements created as tradable water allocations under the Fitzroy Basin ROP, are located in two water management areas in the basin, namely the Nogoia Mackenzie Water Management Area and the Fitzroy Water Management Area. Detailed management arrangements have also been developed for the Dawson Valley Water Management Area, however tradable water allocations are not yet established in this area. Figure 5 shows the nominal volumes for water allocations in the Fitzroy and the Nogoia Mackenzie water management areas.

- **Groundwater supplies**

With the exception of the Callide Valley Groundwater Area and the Braeside borefield, groundwater use in the region is generally limited to supplying a number of smaller towns and for stock and domestic purposes. The Braeside borefield supplies water to mines in the Isaac–Connors sub-region. The Callide Valley Groundwater Area provides water for irrigation, urban and industrial purposes.

Figure 5: Water management areas and water allocations



- **Overland flow supplies**

In recent years there has been a significant increase in the diversion of overland flow water for irrigation and mining. In the past, these diversions were not generally subject to authorisation. The Fitzroy Basin Water Resource Plan has now been amended to include regulation of overland flow.

2.1.2 Water trading

New ways of managing water supplies have been introduced to the area in recent years, including water trading, management of overland flow water, and schemes to promote more efficient water use.

At present, tradable water allocations have been established in the following areas of the Fitzroy Basin:

- along the Nogoa and Mackenzie rivers from Fairbairn Dam to Tartarus Weir
- along the lower Mackenzie and Fitzroy rivers from Tartarus Weir to the Fitzroy Barrage
- along the Dawson River from Glebe Weir to about 18 km upstream of the Fitzroy River junction.

The extent of 'take-up' of trading opportunities between January 2004 and mid-June 2005 is illustrated by the following summary data.

Table 1: Transfer of water ownership in the Fitzroy Basin Water Resource Plan Area

Sub-region	Number of transfers	Volume transferred (ML)
Supplemented supply		
Lower Mackenzie Fitzroy	21	126
Dawson–Callide Valley	6	1051
Nogoa–Mackenzie	25	4362
Unsupplemented supply		
Lower Mackenzie–Fitzroy	5	1702

Notes:

The above trades were predominately medium priority water. The figures do not include transfers of land and water e.g. the sale of an irrigation farm.

Although the trading market is still developing, it is evident that some market participants have effectively improved their ability to meet water needs by purchasing additional allocation on the market.

2.1.3 Demand management and efficiency

Drought has provided a strong impetus for water service providers to implement management strategies that promote reduced consumption among water users. Water users have also invested in demand management measures. Many of these measures have resulted in changes in water use practices that will provide ongoing savings.

Demand management employs strategies like pricing, education, rostering, recycling and water use efficiency, backed by research and development programs, to reduce consumption. This freeing up of water within the existing water resource base extends its ability to support growth or sustain current developments. For example, water users who make efficiency gains are able to either sell surplus allocations or increase their own production.

Urban

In the urban sector, many local governments have initiatives planned to reduce supply network losses. In a number of areas, this is being combined with tariff improvement strategies in an attempt to reduce high consumption rates.

Agriculture

In the rural sector, changes in irrigation methods along a continuum—from current furrow irrigation methods to best practice furrow irrigation and through to subsurface drip irrigation—have seen opportunities for water use efficiency realised.

Water savings from improved water use efficiencies in this sector are usually used to increase production, maintain production levels in drier years and recently, as a potential resource for water trading.

Industry including mining and power generation

There is general industry recognition that water is becoming scarce and there is a requirement for improved water management. This awareness is leading to increased investment in measures to improve water management and better manage risks associated with water scarcity.

2.2 Overview of future water demand

It is anticipated that water demand in the study area will continue to increase, principally driven by growth in the industrial and mining sectors and associated urban development, coupled with some growth in irrigated agriculture.

Demand for water is increasing. This increase is expected to be driven by industry and mining development, and growth in the population.

There is some potential for expansion of irrigated agriculture.

Industrial expansion is expected primarily in the Gladstone region and in the Stanwell–Gracemere Corridor in the Fitzroy Shire. Mining expansion is expected to continue throughout the Bowen Basin and northern Surat Basin coalfields.

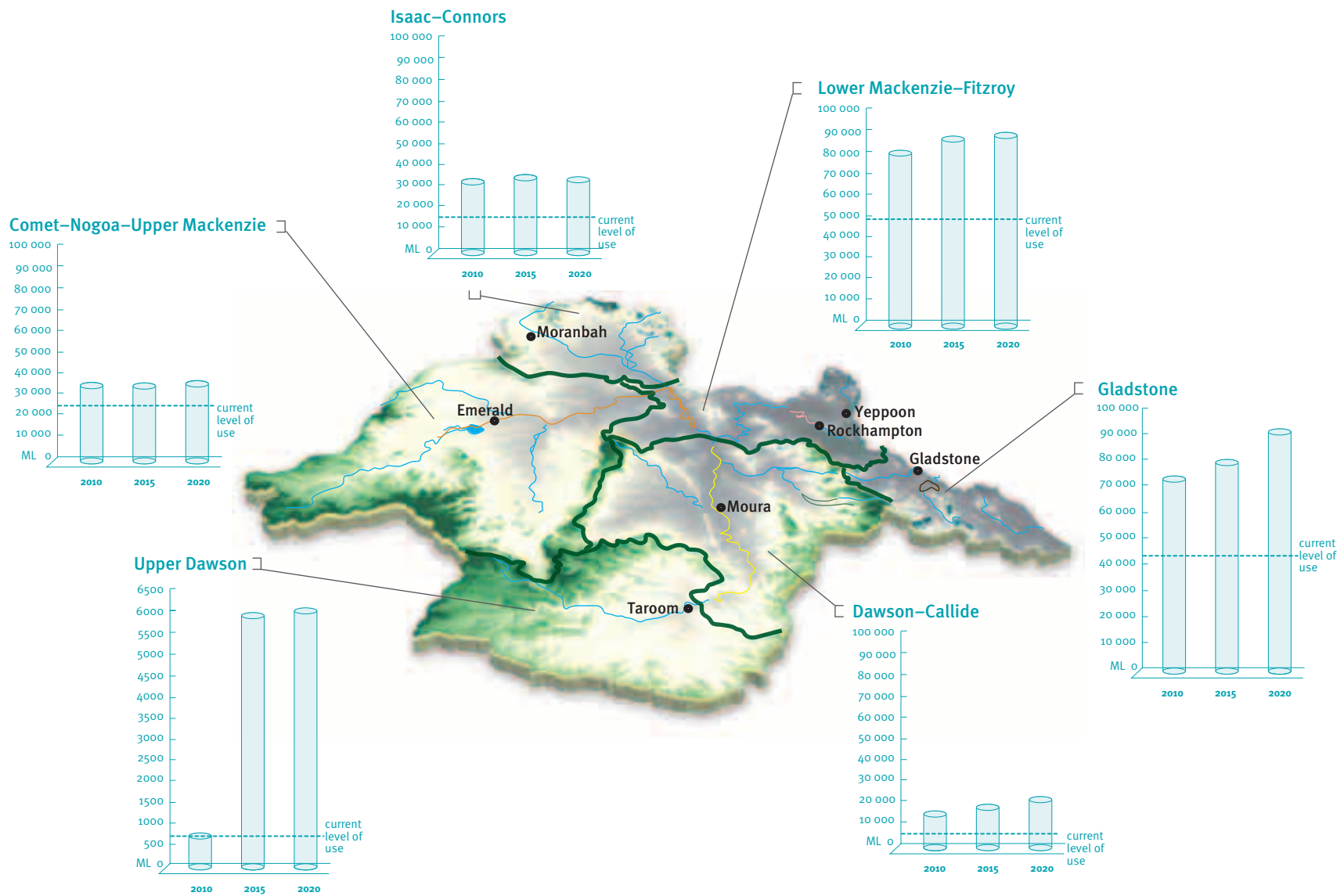
With full development of Nathan Dam, and further use of unsupplemented water, there is potential for expansion of irrigated agriculture.

In the Lower Fitzroy there is potential for intensive livestock production, dependent on a number of factors, including market conditions, availability of appropriate land and water systems to manage water use and waste disposal.

Projected water demands in each sub-region in the strategy area and the associated water supply shortfalls are shown in Figure 6a and 6b respectively, and discussed in Section 2.3. In most sub-regions, shortfalls have been predicted.

The water supply shortfall for high priority water users has been estimated by subtracting current and future water demands from current water supply scheme entitlements. This identifies whether there is a scheme shortfall. In some instances adjustments have been made to account for reduced scheme performances that were identified.

Figure 6a: Projected water demand – urban and industry



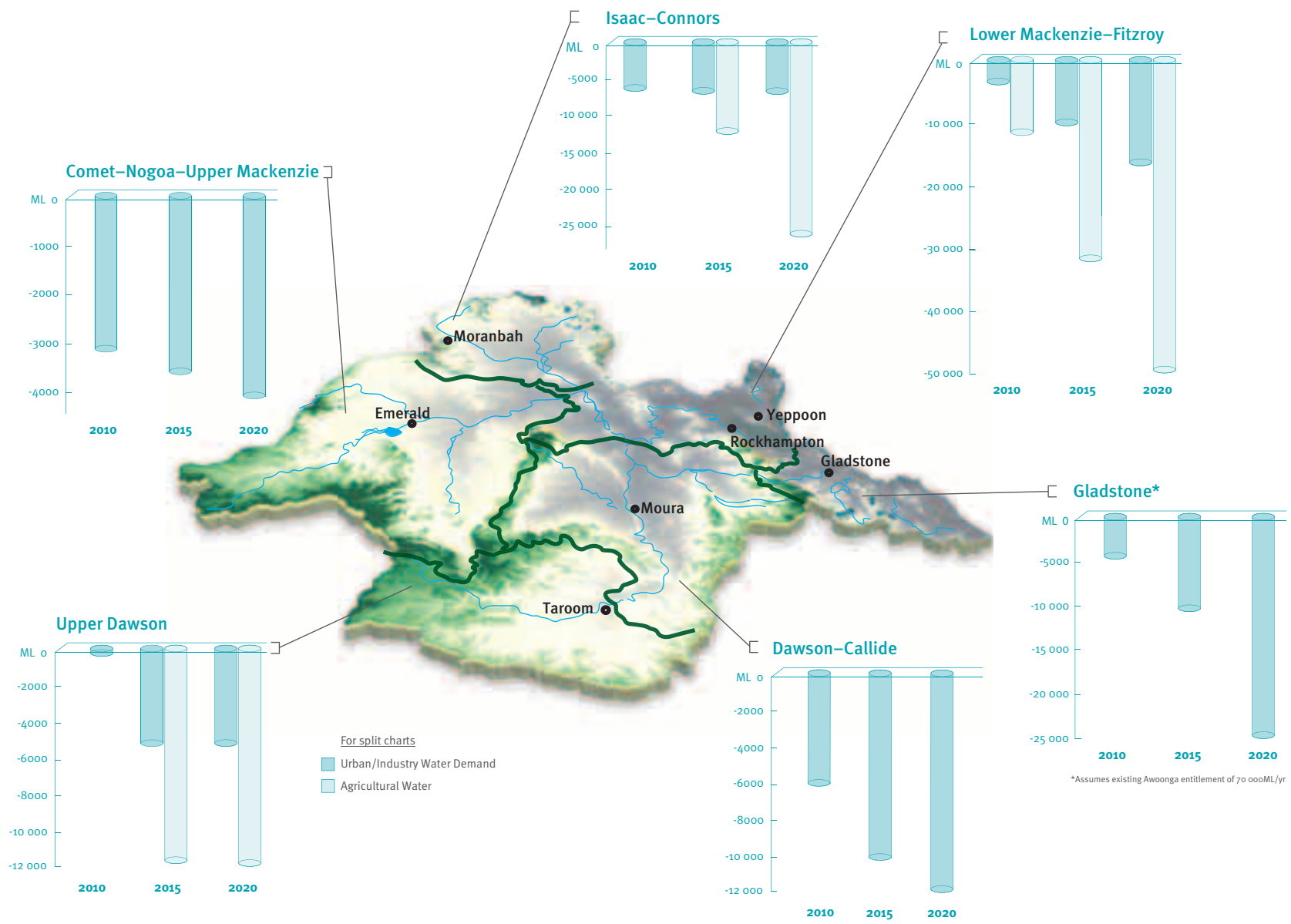


Figure 6b: Potential water supply shortfalls

The estimation of shortfalls has not included potential savings that could be made from demand management measures. Such measures may be able to reduce the shortfalls, and/or delay the need for additional sources beyond the timeframes identified in the strategy.

The estimates of future water use by industrial and urban sectors are based on the best information available. The methodology for the estimation of future water use is detailed in the study report. It should be noted that demand is likely to vary over time. This strategy is intended to be dynamic and flexible and allows for review and updating as circumstances change.

2.3 Adequacy of current supplies to meet existing and future demands in each sub-region

The strategy looks at each sub-region and considers the abilities of the current water supplies to meet demands.

2.3.1 Isaac–Connors

Current supply and use

The Bowen Broken Water Supply Scheme (Figure 3) is located in the Burdekin Basin to the north of the study area, outside the Isaac–Connors sub-region. The scheme supplies a pipeline network servicing the mining industry and urban areas in the upper Isaac–Connors sub-region. Water use from this network was about 7000 ML in 2003–04.

Water is also piped to coal mines in the Isaac–Connors sub-region from Bingegang Weir in the Comet–Nogoa–Upper Mackenzie sub-region and from the Braeside Borefield, Burton Gorge and Teviot Dams in the Isaac–Connors sub-region.

There are three local governments in the sub-region supplying water to a total population of about 17 300 in five towns. Of these, four towns source water from mine pipelines and one from groundwater. In 2003–04, total water use in the towns amounted to about 8500 ML.

There are no major urban or agricultural water supply schemes in the sub-region, and little unsupplemented water is diverted for agricultural use.

Adequacy of current supply for existing demands

Based on authorised entitlements associated with the various supply sources in the Isaac–Connors sub-region, supply should be adequate to meet current demands. However, the recent dry period has demonstrated that the supply performance of a number of these sources is well below that required for urban and mining use. For example, since mid 2004, persistent low storage levels in Eungella Dam have resulted in supplies being restricted to 40 per cent of entitlements. It is anticipated that development of the Gattonvale Off Stream Storage on the Broken River by SunWater will significantly improve system performance. Further assessment of the degree of this improvement is continuing.

Similarly, supply performance from the Braeside borefield is lower than previous estimates, with current extractions believed to be about twice the sustainable yield.

Adequacy of current supply for future demands

Growth in coal mining, associated urban expansion, and limitations of existing water supplies are the key drivers for future water demand in the Isaac–Connors sub-region. Based on demand projections established for the sub-region during preparation of the draft strategy, the supply shortfall was predicted to reach 6500 ML/a by 2020, as shown

Current supply in the Isaac–Connors is of concern.

There are issues with how the Eungella Dam ‘performs’ in very dry periods. Coupled with the growth in the mining industry, supply shortfalls are expected.

in Figure 6b. However, recent information suggests that there has been considerable growth in short and medium term demands in the area. This growth in demand is not quantified at this time.

The Fitzroy Basin ROP makes provision for the short to medium term release of up to 12 000 ML of unsupplemented maximum annual diversion in the Isaac–Connors system and tributaries of the lower Mackenzie and Fitzroy. This potential source would be based on unsupplemented flows, which are highly seasonal and quite irregular.

It is anticipated that this water may be sought by the irrigation and mining sectors.

Demand over the longer term by the irrigation sector is not expected to exceed 26 000 ML of maximum annual diversion.

2.3.2 Lower Mackenzie–Fitzroy including Capricorn Coast

Current supply and use

Capricorn Coast

The Capricorn Coast's water supply source is currently Waterpark Creek. Water use has ranged from 2560 ML/a to 3650 ML/a since 1990. Livingstone Shire Council's authorisation from Waterpark Creek is 4400 ML/a. The Council has implemented a range of demand management measures over the past 10 years, which has allowed for a three percent per annum growth in population, with no overall increase in water consumption. The Council also holds an authorisation to divert up to 7400 ML/a from Sandy Creek, which has not yet been developed, with the Council willing to forego this authorisation if an adequate pipeline supply from the Lower Fitzroy can be provided. The Council has authorisation to develop temporary works in Sandy Creek to access supplies in an emergency situation.

Lower Mackenzie–Fitzroy

The Lower Mackenzie Fitzroy sub-region contains two major water supply schemes—the Lower Fitzroy Water Supply Scheme and the Fitzroy Barrage Water Supply Scheme, which are operated in conjunction (Figure 3). Approximately 76 000 ML is allocated for high priority urban and industrial uses. The schemes also supply approximately 14 700 ML/a of medium priority water, predominantly for irrigation.

Four local governments servicing a total population of about 100 000 in seven towns and localities source supplies from the Fitzroy Barrage Water Supply Scheme, Water Park Creek and local surface water sources. In 2003–04 total water use for urban purposes was about 29 900 ML/a. Rockhampton City Council currently uses about half of its 50 000 ML high priority allocation.

There are also unsupplemented diversions from the Lower Mackenzie River within the Nogo Mackenzie Water Management Area and from the Fitzroy River within the Fitzroy Water Management Area (Figure 5). Water management arrangements for these two

areas are specified in the Fitzroy Basin ROP. These diversions are generally used for irrigation of fodder crops.

In the Fitzroy system, there is approximately 45 000 ML/a of unsupplemented allocations (waterharvesting allocations). There is currently significant under-utilisation of these entitlements. Whilst there is also some under-utilisation in the Lower Mackenzie sub-catchment, the extent is currently not as great.

Adequacy of current supply for existing demands

Capricorn Coast

Whilst the authorisations held by Livingstone Shire Council are adequate for existing demand, there are concerns in relation to the performance of the Waterpark Creek supply scheme. Flows have been declining in recent years in the Waterpark Creek system. If the current dry period continues this would impact on the existing Waterpark Creek supply scheme's ability to meet current needs.

Although the Council's combined authorisations from the Waterpark Creek and Sandy Creek systems total 11 800 ML/a, the combined potential yield of these systems is between 6000 ML/a and 8000 ML/a, dependent on the size of offstream storage and the size of environmental flows required.

Lower Mackenzie–Fitzroy

As indicated above, Rockhampton City Council currently uses only about half of its 50 000 ML water allocation. At this level of use, hydrologic assessments indicate that the performance of the high priority water allocations supplied by the Fitzroy Barrage and Lower Fitzroy water supply schemes is acceptable. This is supported by the fact that water levels in the Barrage have remained well above minimum operating levels in spite of the dry conditions over the last few years.

However, if full use was to be made of both the Rockhampton City Council and Stanwell Power Station allocations, the hydrologic assessments suggest that in times of extreme dry there may be extended periods where the supply, including essential supplies, would be severely restricted or fail. This is considered unacceptable, and additional water will need to be sourced to ensure at least essential supplies in these periods.

Improvements to bring the scheme's performance to an acceptable level could be achieved through new infrastructure, diversification of supply sources and/or improved management arrangements for infrastructure.

Current agricultural demands are considered to be adequately met in this sub-region.

Supply schemes in the Lower Mackenzie and Fitzroy sub-region currently have a large quantity of unused water.

Because the performance of the supplemented supply schemes is less than required, the scheme's performance will need to be improved before this water can be used to meet growing demands.

Adequacy of current supply for future demands

Capricorn Coast

Increased water demand is anticipated as a result of strong urban growth in this area.

If the Sandy Creek system were developed to allow Council to augment the Waterpark Creek supply scheme, the overall volume that could be extracted would be expected to meet supply to beyond 2020.

Alternatively, assuming a yield of 3000 ML/a from Waterpark Creek supply scheme, and no utilisation of the Sandy Creek supply source, the shortfall for the Capricorn Coast is expected to be 1800 ML/a in 2010, increasing to 3250 ML/a in 2020.

Given the reduced rainfall and runoff in this catchment over the past decade, and the relatively pristine environment of Sandy Creek, which is of environmental significance to the region, this strategy does not rely on a water supply from Sandy Creek being developed.

Lower Mackenzie Fitzroy–Urban and industry

Increased water demand is anticipated within this sub-region as a result of industrial growth, particularly in the Stanwell–Gracemere Industrial Corridor.

If rapid growth of the Stanwell–Gracemere Industrial Corridor occurs, projected demands from within this sub-region (including the Capricorn Coast), would create shortfalls in high priority supply of about 3500 ML/a by 2010 rising to 17 500 ML/a by 2020 (Figure 6b).

As outlined above, performance of high priority water allocations supplied from the Lower Fitzroy Water Supply Scheme and the Fitzroy Barrage Water Supply Scheme is of concern. It is anticipated that future demands for high priority water will also require high performance levels.

In addition, water supply from this sub-region is expected to be sought by the industrial sector in the Gladstone sub-region to meet increased forecast demand. Under some demand scenarios, the Awoonga Dam Water Supply Scheme may experience shortfalls of around 4000 ML/a by 2010 increasing to 23 000 ML/a by 2020. Larger shortfalls would result under higher demand growth scenarios.

Inclusion of the potential shortfalls in the Gladstone sub-region in the overall shortfall figures for the Lower Fitzroy sub-region, results in a total shortfall in water for urban and industrial needs of about 7500 ML/a by 2010, increasing to 21 000 ML/a by 2015 and 41 000 ML/a by 2020. These shortfalls would be larger under higher demand growth scenarios for the Gladstone sub-region. In addition, the shortfalls do not include projected demands for high priority water from the Fitzroy Agricultural Corridor discussed below.

Lower Mackenzie Fitzroy–Agriculture

Potential future water shortfalls for agriculture in the Lower Mackenzie Fitzroy sub-region are shown in Figure 6b.

In areas of the Lower Mackenzie and Lower Fitzroy with access to water trading, the majority of future demands could be satisfied by take-up and trading of currently under-utilised entitlements. In the tributaries of the Lower Mackenzie and Lower Fitzroy, where trading is not available, there is expected to be some additional demand that cannot be met from existing supplies.

Potential demands will arise from the development of feedlots and piggeries in the Lower Fitzroy area, referred to as the Fitzroy Agricultural Corridor. The Coordinator-General is currently investigating the feasibility of feedlots and piggeries in this area. Whilst economic and environmental assessments of the proposal are still being undertaken, if such developments were to proceed, there could be demand for up to 8500 ML/a of high priority water for cleaning and stock watering and 27 000 ML/a of medium priority water for the production of silage and to dispose of effluent.

This potential demand could be partially met via trading of currently under-utilised entitlements.

Supply in the Dawson–Callide sub-region is limited, with most sources being fully used.

Groundwater in the Callide Valley is not being replenished as quickly as it is being used.

In the Fitzroy area below the Barrage, demand for additional conventional irrigation is expected to be modest, and the Fitzroy Basin ROP provides for some development to occur. There may be additional demand for development of ponded pasture based on capture of overland flow. This demand may not be able to be satisfied under the existing Fitzroy Basin WRP and ROP.

2.3.3 Dawson–Callide

Current supply and use

There are two water supply schemes in the Dawson–Callide sub-region: the Dawson Valley Water Supply Scheme and the Callide Valley Water Supply Scheme (Figure 3). These schemes principally supply medium priority water for irrigation purposes, with some high priority water used for urban, industrial and mining purposes.

There are four local governments in the sub-region supplying water to a total population of 14 300 in 14 towns. Water for these schemes is sourced from the Dawson Valley Water Supply Scheme (five towns), the Callide Valley Water Supply Scheme (four towns) and other surface and groundwater sources (five towns). Total town water use is currently (2003–04) about 3600 ML/a.

In addition to the supply schemes, private diversions of unsupplemented water in the sub-region occur in the Dawson Valley Water Management Area, the Dawson River tributaries and the Callide Valley groundwater area. Over many years, extractions of groundwater in the Callide Valley have exceeded the area’s recharge ability.

Adequacy of current supply for existing demands

Because the Dawson Valley Water Supply Scheme comprises a series of relatively small weir storages dependent on regular seasonal flows, access to medium priority allocations at the start of an irrigation season is restricted. In most years inflows during the course of the year enable this restriction to be eased, such that access increases toward full entitlement. Use in recent years has varied between about 15 000 ML/a to 39 000 ML/a.

Similarly, urban, mining and industrial users dependent on the scheme may have occasionally experienced restricted supplies at the start of a year until wet season flows replenish the weir storages. However, in most years, these restrictions do not impact on the ability of users to access their full entitlement.

Use of unsupplemented water on the Dawson River and a number of its tributaries also varies from about 200 ML/a to 10 000 ML/a depending on both occurrence of stream flows and crop water requirements.

Groundwater entitlements in the Callide Valley Water Supply Scheme total some 20 000 ML/a. Groundwater is used principally for irrigation, some town water supply and industry. Approximately 4300 ML/a of high priority surface water is supplied from Callide Dam for urban and industrial needs.

Groundwater entitlements in the Callide Valley Water Supply Scheme are known to substantially exceed the system's sustainable yield. Consequently access to this water is limited. Use in recent years has declined to about 11 500 ML/a.

Outside the area where groundwater is supplemented, groundwater entitlements totalling about 16 000 ML/a also substantially exceed the sustainable yield. Usage has declined to about 4000 ML/a due to limited water availability.

Adequacy of current supply for future demands

Currently all unallocated water in the Dawson–Callide sub-region is reserved to be developed as part of the Nathan Dam proposal, which is expected to proceed to development when commercially viable and all approvals obtained. The fully developed dam would meet agricultural demands in the Dawson Valley and part of the supply could be used to meet high priority urban and industrial demands both in the Upper Dawson area and in areas downstream of the dam.

However, an immediate shortfall of up to approximately 3300 ML/a of high priority water has been estimated associated with urban and industrial needs in the Moura area downstream of the dam. This supply is required predominantly for expansions of existing developments and associated urban growth.

The overall projected water demand and shortfall in the Dawson–Callide sub-region is shown in Figures 6a and 6b. By 2020 it is predicted that there will be a supply shortfall of approximately 12 000 ML/a (Figure 6b).

Supply in the Upper Dawson sub-region is limited.

Increased demand for water is expected to come from new mines which may develop in the area around 2011 or beyond.

In addition, it is possible that potential new coal mines in the Upper Dawson sub-region (Taroom, Wandoan) will need to obtain water from the Dawson–Callide sub-region by 2011. This requirement is projected to be around 5200 ML/a by 2015.

2.3.4 Upper Dawson

Current supply and use

There are no supplemented water supply schemes in the Upper Dawson sub-region.

Two local governments in the sub-region supply water sourced from the Great Artesian Basin to supply a population of about 1400 in three towns. In 2003–04 water use was about 770 ML.

There is only limited unsupplemented water development in the sub-region, with irrigation opportunities restrained by the high variability of stream flows and a lack of large waterholes. Fodder and grain are the principal crops, with others grown opportunistically.

Adequacy of current supply for existing demands

The existing groundwater sources are considered adequate to meet urban demands in Injune, Wandoan and Taroom.

Adequacy of current supply for future demands

New mining ventures are expected to be developed in the Upper Dawson area by 2011, depending on the development of rail infrastructure to this area. The projected water demand and shortfall in the Upper Dawson region is shown in Figures 6a and 6b.

By 2015 it is predicted that there will be a supply shortfall of about 5200 ML/a, mainly as a result of projected mining developments (Figure 6b). It is most likely that any Upper Dawson coal mines would be serviced from the Dawson–Callide sub-region, as outlined in Section 2.3.3.

Unsupplemented water for private irrigation development projects will be limited by resource constraints. The volume available for unsupplemented diversion cannot be established until details of the Nathan Dam project are finalised.

2.3.5 Gladstone including the Discovery Coast

Current supply and use

Discovery Coast

The towns of Seventeen Seventy and Agnes Water obtain their water supplies from bores and trenches in the shallow aquifer systems behind the coastal dunes. Demand has increased from 38 ML/a in 1992 to 104 ML/a in 2005. The water is used exclusively for urban water supplies for Seventeen Seventy and Agnes Water.

Gladstone

Awoonga Dam Water Supply Scheme is the major scheme in this sub-region. The scheme provides high priority supplies to urban and industrial users, including the Callide power stations (Figure 3). The Awoonga-Callide pipeline currently delivers about 20 000 ML/a of water (2003–04) from Awoonga Dam to Callide Dam for the Callide power stations.

Over 80 per cent of water used in the Awoonga Dam Water Supply Scheme is for industrial purposes, such as light metal production and electricity generation.

There are three local governments in the sub-region supplying a population of about 36 000 in 12 towns or localities. All supplies in Gladstone City and Calliope Shire, with the exception of Builyan, are supplied from the Awoonga Dam Water Supply Scheme. Supplies in Miriam Vale Shire are sourced predominantly from groundwater.

Gladstone City Council's Calliope River Sewerage Treatment Plant treats about 95 per cent of the city's sewage, with an average daily inflow of 7.5 ML. The treated effluent is reused by the NRG Gladstone Power Station and Queensland Alumina Limited alumina refinery.

Private diversion of unsupplemented water currently occurs in the Calliope, Boyne and Baffle Creek basins.

Adequacy of current supply for existing demands

Discovery Coast

There is significant development pressure in the Discovery Coast area and the existing water supply system is significantly overcommitted (by a factor of two) due to undeveloped planning approvals. The system has reached its sustainable limit and is only capable of supplying the current population of 1800 with severe restrictions. These supplies are supplemented from rainwater tanks, which have been compulsory since 1993.

Gladstone

After the raising of Awoonga Dam, but prior to the major inflows arising from Cyclone Beni in 2003, urban and industrial users supplied from the dam were subject to significant restrictions consistent with a Drought Management Plan developed by Gladstone Area Water Board. A major waste water re-use project was implemented at this time. After Cyclone Beni, restrictions were lifted, although urban users in Miriam Vale Shire are experiencing continuing restrictions.

The raised dam has not yet filled, and the associated water allocation is therefore limited to 70 000 ML/a, which exceeds existing demands. Once the dam fills for the first time, the allocation will be increased to 78 000 ML/a.

Supply in the Gladstone Region is considered adequate to meet demands until sometime between 2011 and 2015.

However, a continuation of the recent dry conditions may see the water demands of the Gladstone area exceeding the Gladstone Area Water Board's existing entitlement by as early as 2009–10.

Adequacy of current supply for future demands

Discovery Coast

The planned ultimate population for Seventeen Seventy and Agnes Water is about 26 500, which will require about 2000 ML/a. This will require the development of additional water supplies as the current bore and trench scheme has reached its sustainable limit of about 100 ML/a. The previous strategy of developing about 550 ML/a of overland flow in the Reedy Creek and Deepwater Creek catchments is no longer feasible due to significant development of individual water supply dams for rural properties.

Gladstone

The demand for reliable water from the Gladstone region is expected to substantially increase as a consequence of the arrival of new industry and the expansion of the operations of existing industry.

It is conservatively projected that demand may increase from the current 55 000 ML/a to between 74 000 ML/a and 88 000 ML/a by about 2010, increasing to between 93 000 ML/a and 118 000 ML/a by about 2020.

Provided Awoonga Dam fills to full supply level, supply augmentation will be required sometime between 2011 and 2015. However, a continuation of the recent dry conditions may see the water demands of the Gladstone area exceeding the Gladstone Area Water Board's existing entitlement by as early as 2009–10.

Should the recent dry conditions continue, it is estimated that Awoonga Dam has sufficient volume in storage to meet current demand obligations until late 2011.

2.3.6 Comet–Nogoa–Upper Mackenzie

Current supply and use

The Comet–Nogoa–Upper Mackenzie sub-region has one major water supply scheme—the Nogoa Mackenzie Water Supply Scheme (Figure 3). The majority of water use from this scheme is for irrigation.

Tradable water allocations have been established in the sub-region along the Nogoa and Mackenzie rivers from Fairbairn Dam to Tartrus Weir. These water allocations are managed under the Nogoa Mackenzie Water Supply Scheme and Nogoa Mackenzie Water Management Area.

There are five local governments in the sub-region supplying town water to a total population of about 24 100 in 10 towns and localities. Water is sourced from the Nogoa Mackenzie Water Supply Scheme either directly or indirectly via mine water supply pipelines, from other surface water sources and groundwater. Total town water use is currently (2003–04) about 10 800 ML/a.

Water use by mines in this sub-region totalled about 5300 ML/a in 2003–04.

Diversion of unsupplemented surface water supplies currently occurs in the Nogoa Mackenzie Water Management Area (Figure 5) and Nogoa–Mackenzie tributaries. In the tributaries the most significant development has been along the Comet River, where some large-scale waterharvesting and overland flow operations have been developed.

Adequacy of current supply for existing demands

Supplemented water allocations in the Nogoa Mackenzie Water Supply Scheme comprise a total of 190 925 ML/a of medium priority water used primarily for cotton irrigation, and 44 398 ML/a of high priority water used by 14 coal mines, several urban communities and for some irrigation of tree crops.

The scheme has been fully allocated for some years and, in recent years, the available water has been fully utilised. Hydrologic assessments suggest that the historical performance of both medium and high priority water allocations supplied by this scheme is suitable for the intended uses, although there have been extended periods where medium priority water has not been available due to restrictions.

Use of unsupplemented water on the Nogoa–Mackenzie River system and its tributaries, mainly the Comet River and Theresa and Retreat creeks, varies considerably depending on stream flows.

Adequacy of current supply for future demands

In this area it is expected that the key driver for increased water supplies will be coal mining developments and associated urban growth, particularly to the south of the Mackenzie River.

Developments to divert overland flow in the Comet area, undertaken prior to the commencement of overland flow regulation, have developed the water resource to the extent that the system is currently considered fully allocated.

This confirms that the area's future urban, mining and agricultural demands will need to be met primarily from water trading, demand management and water efficiency improvements.

Projected water demand and shortfall in the Comet–Nogoa–Upper Mackenzie sub-region are shown in Figures 6a and 6b. It is predicted that by 2020 the shortfall will be about 4000 ML/a.

As the water available in the sub-region has been fully allocated, potential demand for agricultural expansion in this sub-region has not been estimated. Agricultural growth will be limited to producers who have the capacity to obtain allocations on the market or to reorganise the use of their existing allocation.

Supply shortcomings in the Comet–Nogoa–Mackenzie sub-region are highlighted. The supply scheme is fully utilised, and there is no capacity to augment supply.

Future demand can only be met through trading, demand management and water efficiency improvements.

2.4 Urban communities

2.4.1 Urban water supplies

The supply of water to urban communities is the responsibility of local government through the *Local Government Act 1993*.

In accordance with the water needs hierarchy outlined in Section 1.4, the highest value and best use of water can be attained through the trading of existing water entitlements. The high level of competing demands for water in some parts of the Central Queensland region could significantly impact on local government's ability to provide a reliable water supply for urban communities at an affordable rate.

While local governments appreciate that mines have often provided water for local government's urban needs at limited cost, in the longer term, local governments are seeking a greater level of entitlement security and a more direct role in planning for their town's future water requirements.

Currently there is rapid expansion in the coal mining sector in Central Queensland. The expansion of existing mines and development of new mines has a whole-of region impact on urban water supply needs as new workers move into the region.

Major industry development, such as mines, directly affects the local government authorities where the development occurs, as well as other areas in the region where the operational staff choose to reside, such as the coastal catchments.

Local governments have identified a number of concerns and issues with the reliability and affordability of water for urban communities in Central Queensland. The Central Queensland Local Government Association is progressing further investigation of these issues in conjunction with the Local Government Association of Queensland.

Many small communities in Central Queensland are experiencing supply shortfalls. The extended dry conditions exacerbate the issue.

2.4.2 Small communities water supplies

There are numerous smaller urban communities in the study area experiencing increasing difficulty over the recent dry years in maintaining adequate supplies to residents. Many of these communities are reliant on groundwater for all or part of their supply.

In many cases it has been necessary to impose severe restrictions to maintain a supply.

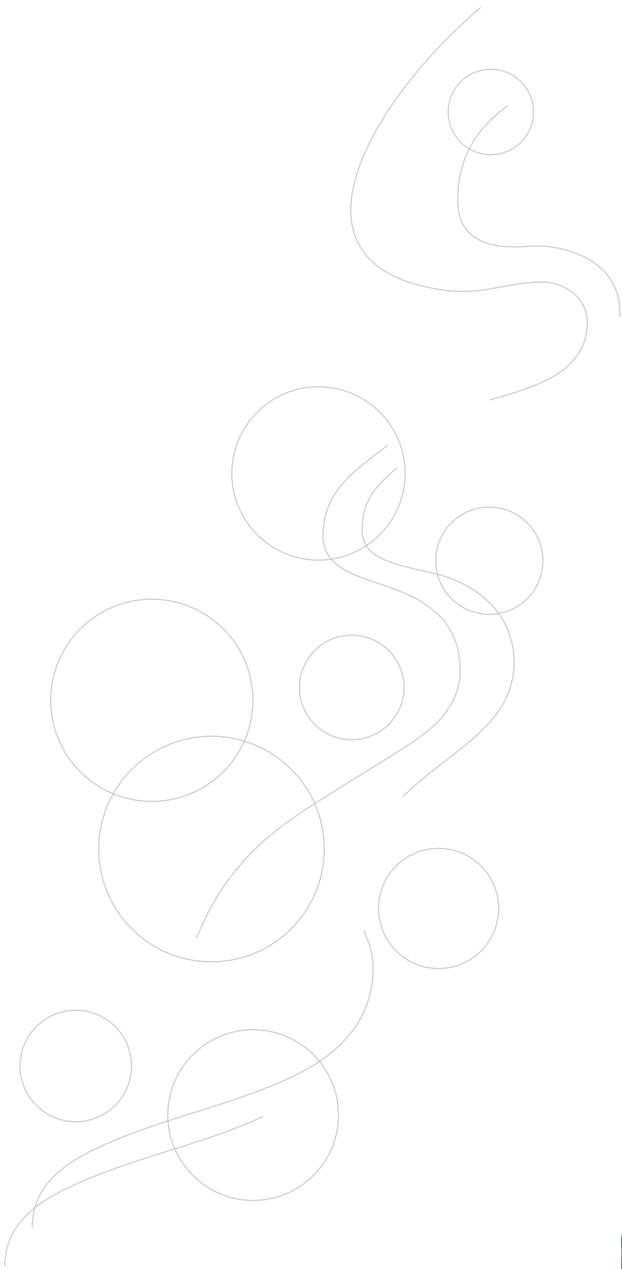
It is recognised that the level of technical expertise available to some local governments may limit the planning and management of these smaller water supply schemes. Traditionally, these small schemes have been considered on an individual basis without consideration of possible regional synergies. Consequently, a regional assessment of the water demand in smaller communities and alternatives for meeting these demands is warranted.

Examples of small communities currently experiencing supply difficulties are shown in Table 2.

Table 2: Examples of small communities experiencing supply difficulties

Sub-region	Town	Supply issue
Isaac–Connors	Nebo	Reliable yield of existing groundwater source unknown
	Glenden	Supply security and supply regime
Lower Mackenzie–Fitzroy	Dingo	Existing sources inadequate, trucking of supply required during drought periods
	Ogmore	Ageing infrastructure requires replacement/refurbishment
Gladstone	Agnes Waters-Seventeen Seventy	Severe restrictions required; development of additional sources involves high cost
	Bororen	Performance of supply of concern
Dawson–Callide	Banana	Now dependent on Moura supply
	Cracow	Has no town supply
	Duarínga	Performance of supply of concern
	Goovigen	Permanent/severe restrictions necessary; poor quality
	Thangool	Now dependent on Biloela supply
	Wowan	Unsuitable quality for most domestic uses
Nogoa–Mackenzie	Springsure	Restrictions required, concerns with ability to meet expected growth
	Rolleston	Restrictions required
	Capella	Performance of supply of concern
	Clermont	Performance of supply from Theresa Creek Dam uncertain

3. Central Queensland Regional Water Supply Strategy responses



3.1 Overview of strategy responses

Traditionally water supplies have been met through the development of new supply sources, however there are limitations on the water resource and more efficient use and management is needed.

Consequently, water efficiency improvements, water allocation trading and demand management will have a higher profile than in the past. Best management practices across all water user sectors, along with existing water use efficiency programs, are a key component of the strategy response. The adoption of practices such as water re-use and recycling will be one of the ways that Central Queensland will be able to ensure a cost effective water savings program.

Diversification of water supply sources, including potential for interaction between two or more supply sources, is also considered. This approach could offer considerable benefits for the region, improving the overall performance of linked supply schemes.

Greater flexibility in water trading should allow users to develop more appropriate mixes of water products for their needs. For example, a town water supply scheme could hold a combination of medium and high priority water allocations, which may enable an appropriate water supply for most years while ensuring essential requirements are met during extreme dry periods.

While the strategy offers avenues to access water supply in most situations, in some parts of the region options will be limited.

3.2 Regional strategy responses

3.2.1 Maximising the effectiveness of supplies through water trading

The first step in the government's three-tiered approach for addressing future water needs involves improved specification and security of existing entitlements and the introduction of water trading.

On release of the Fitzroy Basin ROP, many water entitlements were converted to tradable allocations. In addition to permanent trading, the arrangements allow for allocations to be leased, or seasonally assigned (temporary trading). These allocations are located in the Lower Mackenzie–Fitzroy River, the Dawson River and the Nogoa–Upper Mackenzie River.

It is expected that trading will continue to promote higher value and best use of water, bringing broad economic benefits to landholders and improved outcomes for the natural environment. The flexibility possible through trading will become increasingly important in sub-regions where additional water supplies are not available, thereby promoting innovation and new efficiencies.

The strategy has identified a need to allow for conversion of medium priority allocations to high priority allocations to meet urban, mining or industrial needs in the Nogoa Mackenzie Water Supply Scheme. Implementation of this conversion process is outlined in Section 5.

The options to meet supply shortfalls include:

- Firstly, making better use of existing supplies, then
- Considering options for developing new supplies.

3.2.2 Maximising the effectiveness of supplies through demand management and more efficient use of water

The second tier in the government's approach for addressing future water needs is through improved management of supply systems and usage efficiencies achieved through reduced use and recycling.

Improved management of systems

Given that there are multiple storage systems in the region, which for the major part are operated independently, there may be, for example, opportunities for linking supply systems to optimise storage management. The implementation schedule highlights some elements that are considered important for further investigation in the short term. One critical element of these investigations will be to consider possible linkages between the Lower Fitzroy and Awoonga Dam in the Boyne River Basin. Another aspect will be to assess the potential of Nathan Dam to secure high priority needs in the Lower Fitzroy.

Water trading is available in some parts of the catchment. Not all areas will have this option available.

Demand management and water use efficiency will have a high priority. Existing demand management and water use efficiency initiatives in the region will continue.

Legislative provisions

Restricting water supply

Under the Water Act, water service providers may restrict water supply if necessary because of climatic conditions or water conservation needs. Such restriction may apply to the volume of water taken, the period that water may be taken, and the way that water may be used.

Systems leakage management plans

Under the Water Act, water service providers must, except where exemptions apply, prepare and implement system leakage management plans to minimise water losses. These plans:

- detail system leakage and how the leakage was calculated
- identify measures to reduce leakage, which may include, for example, pressure reduction, system maintenance and overflow reduction
- outline cost-benefit analyses of the implementation of these measures
- for those measures where implementation is cost effective, detail a plan to implement such measures.

Large and medium water service providers are required to prepare system leakage management plans by October 2007, whilst small water service providers are required to prepare system leakage management plans by October 2008.

Drought management plans

The Water Act provides for water service providers to have drought management plans in place to minimise the impact on communities of water shortages caused by drought.

Large water service providers are required to prepare drought management plans by October 2006, while medium and small water service providers are required to prepare drought management plans by October 2007. Exemptions may apply.

More efficient use of water

Although demand management has been a priority for most water service providers in recent years, and gains have been significant, additional gains could be made over the long term.

For the rural sector: further reductions in water distribution losses and irrigation improvements are expected to yield significant water use savings, allowing for production gains, maintenance of production in drier years, or trading.

For the urban sector: significant savings could be made, particularly in new developments.

Potential savings were considered to be achievable. For example, savings of up to 19 per cent, or 6000 ML/a were considered achievable for communities in the Lower Fitzroy.

While acknowledging that significant progress has been made in the region, further cost-effective savings could potentially be made in many areas, including:

- measures aimed at improving the water use efficiency of residential outdoor water use such as:
 - appropriate pricing
 - permanent low level water restrictions (set times on alternating days for irrigating gardens)
 - landscaping and irrigation advice
 - rebate programs
 - audit and retrofit programs.
- implementing mandatory internal water use efficiency measures in new residential and non-residential developments. Improvements to outdoor water use efficiency will be achieved through local landscape and site coverage planning controls and irrigation advisory services in partnership with developers.
- potable water loss reduction programs implemented by water service providers, including active leak detection and pressure management. Funding for these programs is available through the Reduction of Potable Water Consumption and Loss component of the Water and Sewerage Program (WASP), which is administered by the Department of Local Government, Planning, Sport and Recreation (LGPSR).
- use of recycled water as a resource rather than its disposal to land.

To further facilitate effective demand management, appropriate per capita usage targets for urban communities across the region are to be determined.

For industry and power generation sectors: further water savings to those already planned are potentially achievable. The following actions could be taken to encourage demand management in the non-residential sector:

- encouraging demand management through appropriate pricing structures, such as volumetric wastewater charging
- further encouraging high-volume non-residential users to undertake water efficiency audits and implement water efficiency measures to assist in a reduction of potable water demand. Incentive programs for investing in water efficiency measures should be considered by water service providers
- continue to maintain a 'watching brief' on alternative technologies for reducing cooling tower water use, including the assessment of costs, efficiency improvements and environmental performance.

For the mining sector: there is general industry recognition that water supply is becoming scarce, and this growing awareness is leading to increased action for improved water management. There is considerable investment in water planning and implementation of works.

There is significant variation in the way water is managed across coal mines. Accordingly, it is inadvisable to attempt extrapolation from the water use of an 'average' site. However, the coal association research program (ACARP) is funding the development of a formal process of sharing information about water management practices as a basis for planning and implementing change. An online tool called WaterMiner is now available (<http://selkie.smi.uq.edu.au/waterminer/>) which provides access to a range of site-specific information on coal mine water use, a water practices catalogue and a capability for examining scenarios for demand management.

The first phase of this research is now complete and the following conclusions can be drawn:

- Leading practice water production ratios (ML/Mtpa) have been compiled for a range of tasks carried out on seven mine sites. Estimates of the implication of applying these ratios across all sites indicate considerable potential for reduction in total water use and in the importation of fresh water to sites.
- Application of the leading production ratios results in increases in on-site salinity which must be managed. Estimation of the value of water in production terms and the relative costs of purchasing water and desalination to make more fresh water available indicate that potential value far exceeds costs. Therefore, if water is in short supply, desalination is economically attractive irrespective of variations in the cost. Acceptable management of the resulting brine remains a challenge.
- There is clear evidence that barriers associated with the use of worked water (recycled water) in the coal preparation plant and for dust suppression are being overcome by experience (currently these practices use the majority of water on site).
- Demand management through the introduction of evaporation control could be an important part of a mix of practices which would help sites achieve leading practice. There is little evidence of demand management being applied to evaporation control currently.
- To achieve leading practice and manage risks associated with ensuring water security and acceptable discharge, sites must consider improved management of overland flow and water storage capacity. Consideration needs to be given to the implications of ongoing significant importation of fresh water from off-site compared to more effective incorporation of on-site run-off, taking into account ecosystem requirements, environmental flows and implications for downstream storages.
- The supply of water under a full 'take-or-pay' arrangement is unlikely to facilitate a water saving ethos at mine sites.

- Underground mines provide a potential target for improved demand management.
- A more integrated approach to water management across on-site teams is likely to deliver improved outcomes.

3.2.3 Increasing water supplies through release of unallocated water

Consistent with the government's policy, unallocated water will only be released where alternatives such as water trading, unused parts of current water entitlements, or increasing water use efficiency have been fully explored.

However, water should be reserved for specific future infrastructure projects, which the government has identified, through a water planning process such as this strategy. These projects would be expected to be of high value to the community at some time in the future. Similarly, in certain areas, water could be reserved to meet the future needs of nominated urban communities.

The need to reserve water for future infrastructure projects has been based on assessment of projected water supply shortfalls, using best information currently available. Projected water requirements will be reviewed and updated as part of the implementation process for the strategy.

A series of steps is likely to be required before any water reserved in association with potential infrastructure identified in this section would be released to development proponents and/or other competing water users. The mix of medium and high priority water associated with the infrastructure will be determined closer to the time of development. This mix would be based on market considerations.

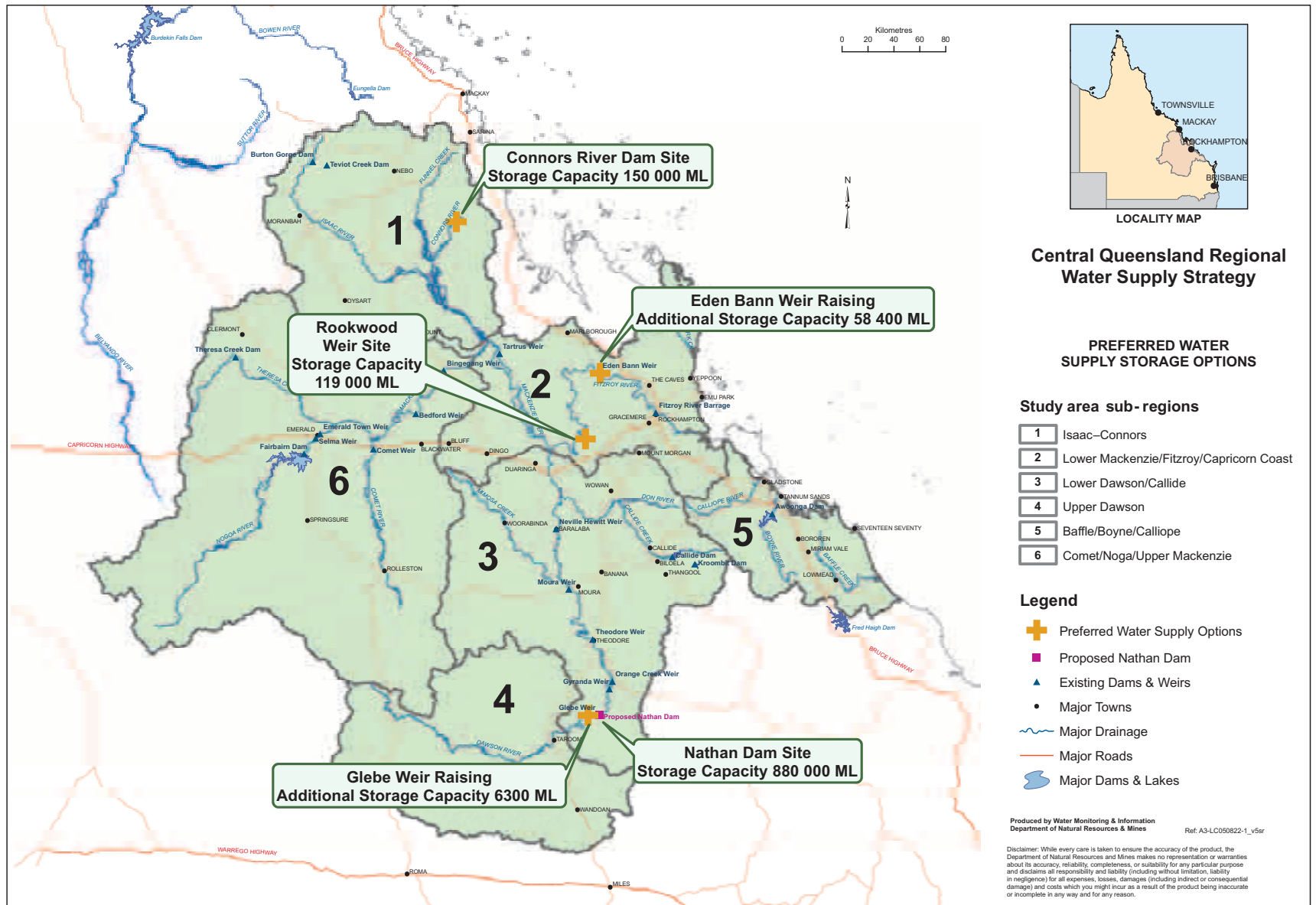
The infrastructure options will only proceed to development after full project evaluation and impact assessment studies have been satisfactorily completed and all necessary regulatory approvals obtained and a proponent identified. Included in the environmental assessments will be consideration of matters associated with implementation of the Reef Plan.

It is expected that the potential infrastructure options identified would be progressed at the appropriate time on a commercial basis as is provided for by the Queensland Government *Guidelines for Financial and Economic Evaluation of New Water Infrastructure in Queensland* and the *Water and Sewerage Program*.

For each of the sub-regions in the study area, Section 3.3 indicates the government's intended position over the strategy period regarding the release or reservation of unallocated water in the Fitzroy Basin.

The government's state-wide principles for the release of water will apply to the unallocated water referred to in Section 3.3. Releases would be made as water allocations or water licences using market based mechanisms to establish prices.

Figure 7: Preferred water supply storage options



In the Isaac–Connors sub-region construction of a pipeline from downstream of the Burdekin Falls Dam to Moranbah has started.

This pipeline is expected to meet short to medium term demands.

In the medium term if additional demand cannot be met by efficiency gains or trading, a new dam on the Connors River is proposed.

3.3 Sub-regional strategies

3.3.1 Isaac–Connors

As a sizeable additional supply is required for mining and urban needs in this sub-region, it is not expected that demand management savings alone will be sufficient.

Short term

It is expected that the area's additional coal mining demands will be met by the Burdekin–Moranbah pipeline being developed by SunWater, for which SunWater already holds allocations in the Burdekin River catchment.

It is expected that this additional supply of some 23 000 ML/a, will be adequate to meet short to medium term needs for coal mining.

Additional urban demand in Moranbah being generated by the coal industry expansion is expected to be serviced under arrangements with the relevant mining companies that provide water in these areas. Availability of water from the Burdekin–Moranbah pipeline for mining needs is expected to allow the mining companies to provide improved urban supply.

Additional agricultural demands may be met by release of unsupplemented unallocated water by grant of water licence. Details of volumes and triggers for such releases are provided in the implementation schedule.

Medium to longer term

It is anticipated that the medium term urban and industrial water demands may exceed the supplies that can be provided by the above strategies. These additional demands could be met by the development of a dam on the Connors River at the Mt Bridget site (Figure 7), and associated distribution pipeline.

The development process for a Connors River Dam needs to commence in the immediate future given the time required to prepare impact assessment studies, secure approvals and construct the dam, and the time required for it to fill.

To confirm the suitability of the Mt Bridget site for possible future development of a dam, it is intended that more detailed studies of the site and potential storage area be undertaken during 2006–07. This includes assessment of a number of environmental matters associated with the proposed dam site. Further details are provided in Section 5.

Unallocated water will be reserved in association with this proposal. The approximate volume to be reserved will be identified following the investigations identified in Section 5. Based on the preliminary assessments conducted for the strategy, a Connors River Dam is expected to provide in the order of 30 000 ML/a high priority supply.

Subject to satisfactory water pricing arrangements, part of the supply available from a Connors River Dam could be made available to meet agricultural demands in the area downstream of the dam.

3.3.2 Lower Mackenzie–Fitzroy

Some of the projected demands detailed in Section 2 are expected to be met by demand management measures. For example, substantial volumes of treated effluent are currently produced in the area and this will increase proportionately with population growth. This water is currently under-utilised and is a resource warranting consideration as a potential source of supply.

The Lower Fitzroy river system will be the next main source of supply for the urban and industrial needs of the Rockhampton, Fitzroy and Livingstone council areas and the Gladstone Area Water Board.

To reliably meet the needs of these areas, which are mainly for high priority water, further infrastructure will be required on the Lower Fitzroy River. Appropriate pipeline infrastructure would also be required to deliver water to the desired locations.

Demands that cannot be met by trading and demand management savings alone are expected to be able to be met by obtaining access to supplies from the infrastructure identified in this section.

The timing of the onset of the demands from these different areas may vary considerably, and are likely to have an effect on the preferred staging of the developments.

A volume of unallocated water will be reserved for the future storage developments as detailed below.

Short to medium term

Building on the preliminary investigations that were previously undertaken, further investigations into the raising of Eden Bann Weir and constructing Rookwood Weir will be undertaken.

Pending satisfactory completion of the investigations, it is expected that Eden Bann Weir will be raised and Rookwood Weir constructed by the end of 2011.

The investigations will include environmental, social, cultural, and economic evaluations, and will provide data necessary for environmental impact assessments. The outcomes of these investigations will assist the selection of the most appropriate arrangements of this infrastructure to meet the short, medium and long term water demands, including the size, and any staging of the infrastructure.

In the Lower Mackenzie–Fitzroy sub-region short to medium term urban and industrial needs that cannot be met by trading or efficiency measures are expected to be met by the raising of Eden Bann Weir and construction of a weir at Rookwood.

Further investigations are underway to assist in selecting the most appropriate arrangements to meet the short, medium and long term water demands, including the size and any staging of the infrastructure. Longer term demands, are expected to be supported by infrastructure developments as well as linking other supply schemes with the Lower Fitzroy schemes (for example, Awoonga Dam or the proposed Nathan Dam).

As part of these investigations, potential synergies across the Fitzroy and Boyne catchments will be examined to increase the supply available through the interconnection of the supply systems. This includes the potential for Awoonga Dam to operate in conjunction with the Lower Fitzroy supply schemes by linking the supply systems, and for Nathan Dam to provide supplies to the Lower Fitzroy, particularly in critical water supply periods.

More detailed consultation is proposed with landholders potentially affected by the proposed infrastructure.

Provision of a higher level river crossing at Riverslea to accommodate the inundation of the existing crossing by the Rookwood Weir pond would provide increased access opportunities for the local community.

Some agricultural demand is expected to be met by take-up of currently unutilised, or under-utilised water allocations. There is in the order of 30 000 ML/a of unsupplemented water allocations (with waterharvesting conditions) in the Fitzroy River area not presently being fully used. Trading is provided for along the Lower Mackenzie and Fitzroy River upstream of the Fitzroy Barrage that should facilitate uptake of these allocations.

However this unsupplemented water is not considered suitable for proposed developments associated with the proposed Fitzroy Agricultural Corridor which would require both medium and high priority supplemented water sourced from infrastructure on the Fitzroy River.

For areas above the Fitzroy Barrage, without access to tradable water allocations, an opportunity to obtain additional supply will be provided through the release of unsupplemented water licences during 2006.

For areas below the Barrage, a future amendment to the Fitzroy Basin ROP is expected to provide opportunity for access to some overland flow development.

In addition, the release of up to 8000 ML/a of unsupplemented water allocation (with waterharvesting conditions) in the Lower Mackenzie River, as provided for in the Fitzroy Basin ROP, will occur if water trading is not sufficient to meet agricultural demands.

Longer Term

Along with water trading and water efficiency gains, it is expected that the area's longer term urban, industrial and agricultural demands will be met by the raising of Eden Bann Weir and development of Rookwood Weir, operated in conjunction with the Fitzroy Barrage, Awoonga Dam and potentially Nathan Dam. It is anticipated that the conjunctive operation of the lower Fitzroy and Awoonga Dam systems will improve the overall performance of the water supplies, and potentially enable additional water to be made available.

Longer term agricultural irrigation demands will need to be met by water trading, and if available, further small releases of unsupplemented unallocated water.

Capricorn Coast

It is expected that demands of the Capricorn Coast area that cannot be met through demand management, water reuse and water use efficiency gains would be met by a pipeline to the Lower Fitzroy, in conjunction with the proposed infrastructure identified above. This option would be progressed by the Livingstone Shire Council. The pipeline will be funded jointly by the state and federal governments and Livingstone Shire Council.

3.3.3 Dawson–Callide Valley

Short to medium term

An allocation has already been reserved for the Nathan Dam development, within the Fitzroy Basin Water Resource Plan. It is envisaged that urban and industrial high priority demands and medium priority agricultural demands could be met by development of Nathan Dam.

Utilising the proposed Nathan Dam to provide supplies to the Lower Fitzroy, particularly in critical water supply periods, is also a potential option as discussed in the previous section.

If the Nathan Dam development were to represent a feasible solution to meeting water supply needs for the Lower Fitzroy, it could influence the timing of Nathan Dam development.

It is expected that development of the dam would commence when impact assessment studies are completed, outstanding approvals have been obtained and the project is considered to be commercially viable, either as a stand alone solution for the Dawson–Callide sub-region, or as a combination solution for the Lower Fitzroy and Dawson–Callide sub-regions.

The options for meeting needs for high priority water in the Dawson prior to the completion of Nathan Dam are trading and more efficient use of water. Trading would most likely involve the purchase of medium priority water allocations, in conjunction with the development of off-stream storages. It is considered that these options should be adequate to meet the pressing needs in this sub-region, prior to the development of Nathan Dam.

For the Callide Valley, performance issues associated with the scheme will be addressed as part of an amendment to the Fitzroy Basin Water Resource Plan commencing in 2006 to include Callide groundwater.

In the Dawson–Callide sub-region short to medium term needs that cannot be met by trading or efficiency measures are expected to be met by construction of Nathan Dam on the Dawson River.

Apart from adoption of more stringent water use efficiencies or alternate technologies, such as desalination or air cooling for power stations, a potential additional source of high priority supply to the Callide area would be water piped from a future Nathan Dam.

3.3.4 Upper Dawson

In the Upper Dawson future high priority demands are expected to be met from Nathan Dam.

There is also a proposal to release unsupplemented water, following finalisation of the Nathan Dam project.

Short to medium term

It is expected that the projected mining demands identified in Section 2 of the strategy could be met by the Nathan Dam development.

If Nathan Dam has not been constructed before these mines plan to commence operation, there are a number of alternative options that could be considered. For example, supply from groundwater including the Great Artesian Basin, or water associated with coal seam gas extraction would be a possibility, in conjunction with water efficient processes.

The taking of water from the Great Artesian Basin is regulated through the Great Artesian Basin Water Resource Plan. The plan divides the Great Artesian Basin geographically into management areas and makes provision for the granting of unallocated water, subject to conditions limiting access to the water.

If groundwater or water from coal seam gas sources were insufficient, another option would be to raise the Glebe Weir which could provide a high priority water supply of up to 2000 ML/a (Figure 7). However, Glebe Weir would be flooded by the construction and filling of Nathan Dam, and hence this would be considered a temporary supply to be replaced by supply from Nathan Dam. It is expected that the weir raising would be a relatively high cost solution due to technical aspects associated with the raising. As such it would only be suitable for very high value uses such as coal mining.

It is expected that the area's agricultural demands will be met by release of unsupplemented unallocated water when the details of the Nathan Dam project have been finalised.

It is expected that the Gladstone area longer term future urban and industrial demands will be met primarily via a pipeline from the Lower Fitzroy system.

3.3.5 Gladstone and Discovery Coast

The area's projected growth in urban and industrial demands which are not met by demand management savings will require access to high priority supplies which can only be provided from new water sources.

It is expected that the majority of the area's additional urban and industrial demands in the longer term will be met from the Lower Mackenzie–Fitzroy River system via a pump station pipeline system linking the Fitzroy Barrage storage to the Gladstone Area Water Board's reticulation system. The possible timing of these developments would be a matter for the board to consider.

In these circumstances, part of the high priority allocation reserved for the Lower Fitzroy weir developments would be used to meet the Gladstone area demands. This strategy outcome is reflected in Section 3.3.2.

Discovery Coast

There would be potential for Miriam Vale Shire to access water, via a pipeline, to Gladstone. However, the Miriam Vale Shire Council's preferred water supply strategy for the Discovery Coast is desalination and efficient use of water resources. The council has developed an integrated water strategy that comprised of a non-asset strategy (which incorporates pricing policy and regulation), a water supply strategy (based on the current supply plus desalination), a wastewater strategy and a water recycling strategy.

3.3.6 Comet–Nogoa–Upper Mackenzie

The area's future water needs will have to be met by trading and demand management savings, as there is no unallocated water available in this area. Small volumes, for stock and domestic use and council road maintenance, can continue to be made available in accordance with the Fitzroy Basin ROP.

Some potential savings have been identified through reduction in system losses by lining distribution channels in parts of the Nogoa Mackenzie Water Supply Scheme. It is expected the water service provider, SunWater, in consultation with water users, will seek to have these savings converted to tradable water allocations.

Water trading is likely to provide the relatively small volumes required to meet coal mining demands in this sub-region without creating undue economic or social impacts. However, provision will be made for the conversion of medium priority water allocations to high priority water allocations in the Fitzroy Basin ROP, to facilitate such trading occurring.

Timing of the process to amend the Fitzroy Basin ROP rules relating to the conversion of water allocation priority groups is provided in Section 5.

In the Comet–Nogoa–Upper Mackenzie sub-region needs will have to be met by trading or efficiency measures as no further unallocated water is currently available.

3.4 Urban communities strategy

3.4.1 Supporting solutions for urban community water supplies

In areas with identified unallocated water, a reservation will be established for urban community needs.

Policy and program development is needed to address the challenge of balancing affordable water supplies and demand. This is of particular relevance in areas where there is strong competition for the scarce resource, such as there is in parts of Central Queensland.

While local governments appreciate that mines have often provided water for local governments' urban needs at limited cost, in the longer term, local governments are seeking a greater level of entitlement security and a more direct role in planning for their towns' future water requirements. The potential for improvements in allocation security and supply regimes will be explored, with a particular focus on towns supplied by mines, in the Isaac–Connors and Upper Mackenzie catchments.

3.4.2 Supporting solutions for small communities

The previous sections have outlined a water supply strategy at a regional and sub-regional scale that provides a framework within which water supplies for small communities can be considered.

To address the needs for smaller communities it is proposed that the Central Queensland Local Government Association coordinate a regional assessment of water demands in smaller communities and alternatives for meeting the demands. This study would investigate both specific solutions for individual small communities, and generic solutions that may be appropriate for a number of small communities within the study area.

The study would consider solutions involving new infrastructure or new water allocations as well as options for increasing the efficiencies of water use or accessing existing water allocations through trading. Consideration of the most appropriate water priority mix would also be included. Undertaking the study on a regional basis should provide significant efficiencies and cost reductions allowing a full range of options to be considered on a consistent basis.

The study would provide an initial assessment of opportunities for local governments to work collaboratively on:

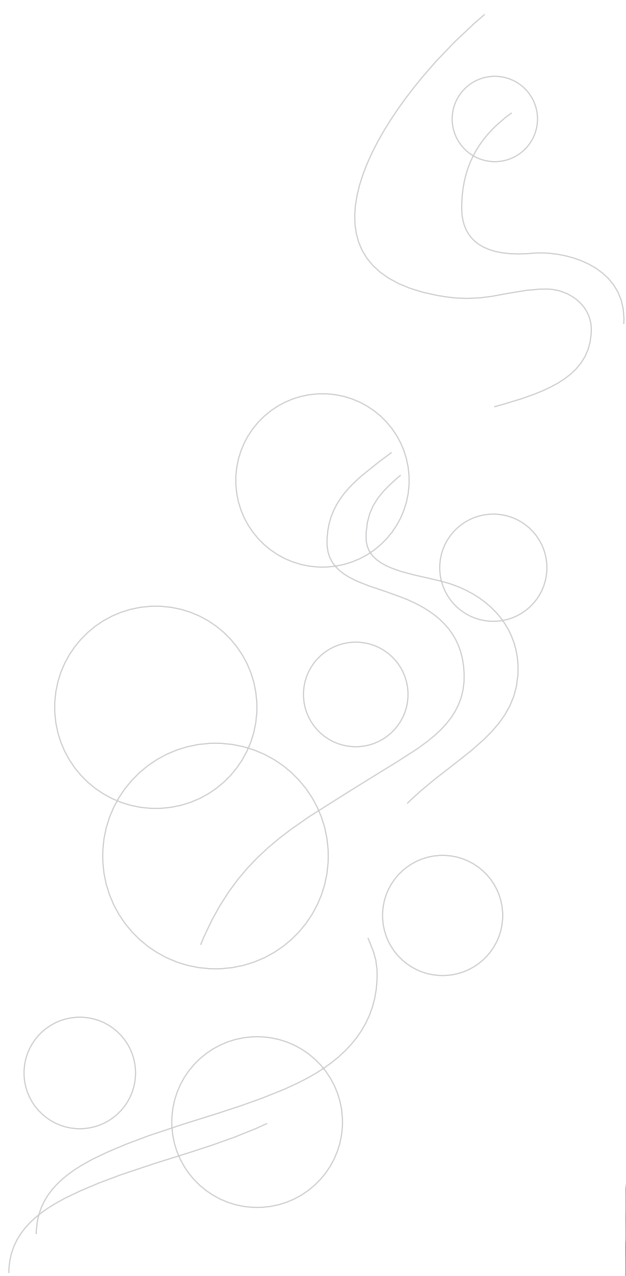
- joint water supply options (such as pipelines)
- implementing consistent regulations (for example regulations relating to rainwater tanks)
- encouraging voluntary community adoption of best practice water conservation.

Undertaking a study on a regional basis would allow for funding under one of the State Government's financial assistance programs to be considered. These programs are designed to support councils working together to provide joint services.

The proposed study would require strong support from the local governments involved. Commitment by the local governments would need to include willingness to progress the study and the studies findings on a collaborative basis, and to provide partial financial support for the study.

The Queensland Water Directorate is a professional association, established as an initiative of local government water industry professionals. The directorate has indicated that they are prepared to provide some financial and in-kind support to the project if it has the support and commitment of the local governments. The Department of Natural Resources and Water has also indicated a willingness to provide in-kind support to the project.

4. Strategy risk analysis



Strategy risk analysis

Addressing water supply risks requires an ongoing monitoring and consultation process.

A key risk to the strategy is climate variability and change.

As part of the study, a risk management approach was utilised to identify any longer term implications for the proposed strategy responses and to determine appropriate actions or ‘treatments’ to mitigate them.

Three levels of risk were established, low, medium and high. The level of risk was determined based on the perceived likelihood of the risk event occurring, and the consequence of the risk event occurring.

The following categories of risk were identified:

- Climate risks
- Demand risks
- Availability of supply risks
- Environmental risks
- Social risks
- Economic and financial risks
- Stakeholder risks.

Generally, the means of mitigating or treating the risks requires processes for monitoring and reviewing the strategy input data and processes, and provision for consultation with affected stakeholders.

The most significant risks were identified as climate variability and climate change, which may have already had an impact on rainfall and therefore stream flows.

Consideration was also given to the possible implications for the strategy that might arise from issues under consideration outside the strategy area, for example, in adjacent catchments.

The outcomes of the risk analysis are provided in Table 3.

Table 3: Risk analysis

Identified risks	Risk consequences	Risk likelihood	Risk evaluation	Risk treatments
Climate change/climate variability <ul style="list-style-type: none"> • Temperatures rise • Rainfall/runoff events become less frequent • Rainfall/runoff events become more intense • Rainfall/runoff events become more scattered • Severe drought occurs 	Reliability of supplies from existing sources reduced	Likely	High	Continue collection and analysis of meteorologic, hydrologic and environmental data
	Quality of supplies from existing sources reduced	Likely	High	Complete review of the water resource plans at 10-yearly intervals
	Demand for supply, particularly from rural users increases	Likely	High	Reassess ability of existing sources to meet existing demands at 10-yearly intervals
	Supply available from new source options less than currently estimated	Likely	High	Re-assess ability of new source options to meet demands at 10-yearly intervals
	Stress on some environmental systems increased	Likely	High	Development of drought management plans for water supply schemes
	Supply failure	Possible	High	Optimise supply scheme management, for example opportunities for conjunctive use of schemes
				Consider benefits of developing alternative supply sources when considering future supply options
Identified risks	Risk consequences	Risk likelihood	Risk evaluation	Risk treatments
Water demands <ul style="list-style-type: none"> • Forecast population trends change • Forecast industry trends change • Forecast mining trends change • Forecast agricultural trends change • New production technologies emerge • Water use practices change 	Water volume demands vary from predicted trends	Likely	Medium	Update industry and mining demand projections at 3-yearly intervals
	Water priority demands vary from predicted trends	Likely	Medium	Update urban and rural demand projections at 6-yearly intervals
	New supply sources not developed at optimum time Increasing achievement of water conservation measures can make it more difficult to implement short-term water savings that may be required under significant drought conditions	Possible	Medium	Re-assess ability of existing sources to meet industry and mining demands at 3-yearly intervals Re-assess ability of existing sources to meet urban and rural demands at 6-yearly intervals Adequate planning for future growth needs to incorporate consideration of the effect of long term reductions in overall water usage

Identified risks	Risk consequences	Risk likelihood	Risk evaluation	Risk treatments
Availability of supply <ul style="list-style-type: none"> Predicted savings from improved supply system management and water use practices not realised Community concerns restrict development of waste water re-use proposals Trading in allocations not effective in meeting priority needs New sources of supply not developed in time to meet demands Alternative sources of supply become available in adjacent catchments, for example, Bowen Broken 	Existing users not able to benefit	Possible	Low	Maintain and enhance incentives for water service providers to improve supply. Maintain and enhance incentives for water users to improve water use practices Monitor water supply improvements and water use savings Undertake sufficient assessments of new source options to establish appropriate certainty regarding development timeframes Monitor effectiveness of trading regime in meeting priority needs Amend ROP as necessary to address any restraints to trading Initiate and manage process for the development of new sources of supply in a timely and effective way Review any new major supply sources developed for their ability to meet the projected needs in the strategy area
	New users not able to access supply as needed	Possible	High	
	Preferred options in the strategy may no longer be the 'best' solution	Possible	Medium	

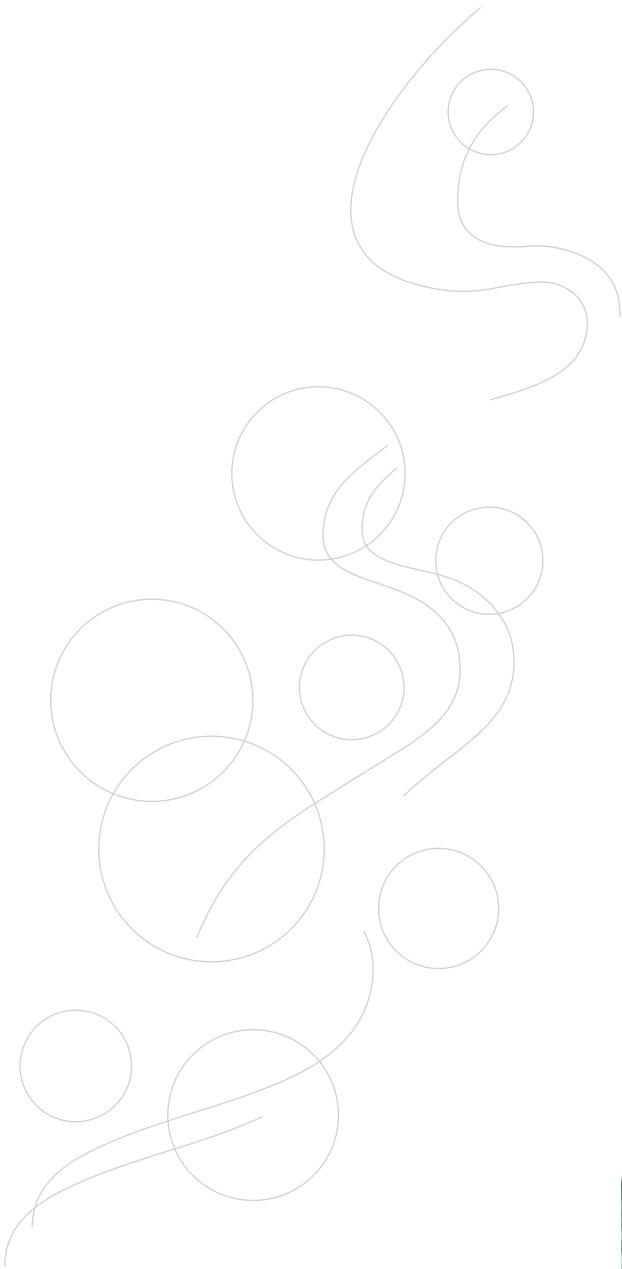
Identified risks	Risk consequences	Risk likelihood	Risk evaluation	Risk treatments
Environmental issues <ul style="list-style-type: none"> Quality of supply from existing sources varies over time Environmental issues emerge which preclude development of preferred new source options Quality of supply from new source options less than anticipated Catchment impacts from existing and new water uses develop over time 	Supply from existing sources becomes unfit for purpose	Unlikely	Medium	Continue State water quality and ecosystem monitoring as per the ROP Continue water quality and ecosystem monitoring at and downstream of existing storages as per the ROP Commence water quality and ecosystem monitoring at proposed new source options Evaluate state-of-the-environment reports to identify emerging issues as soon as practicable
	Supply from new source options unfit for all intended uses	Unlikely	Low	
	Alternative source options need to be identified and developed	Possible	Medium	
	Conditions of use of existing allocations need to be varied	Possible	Medium	
	Additional environmental management strategies need to be developed and implemented for new source options to address unforeseen issues	Likely	Medium	

Identified risks	Risk consequences	Risk likelihood	Risk evaluation	Risk treatments
Social issues <ul style="list-style-type: none"> Landholders in new source areas are disadvantaged Quality of life is impacted upon by restricted availability of supply Employment opportunities are affected by restricted availability of supply 	Landholders in proposed new source areas suffer uncertainty for undue periods	Likely	Low	Fully inform landholders in proposed new source areas of possible impacts and their timing
	Property values in proposed new source areas affected because of uncertainty	Likely	Low	Monitor property values in areas of possible impact
	Lifestyle activities e.g. gardening and recreation are restricted	Possible	Low	Address landholder concerns in project development phase e.g. access issues
	Health issues arise because of inadequate quantity/quality of supplies	Unlikely	Low	Risk treatments as for water demands and availability of supply issues
	Costs of unemployment due to restricted economic development are higher than otherwise	Possible	Low	

Identified risks	Risk consequences	Risk likelihood	Risk evaluation	Risk treatments
Economic and financial issues <ul style="list-style-type: none"> Economics of existing industries are impacted upon by restricted or more costly water supplies Expansions and new industry developments are delayed or abandoned Industry impacts have flow on effects to other industry sectors 	Production constraints impact on viability of existing and new industries	Possible	High	Maximise certainty (and minimise risks) for the development of necessary new water sources adequately in advance of needs
	Viability of other industry sectors is impacted upon	Possible	Medium	Consider all potential funding opportunities, develop business case in advance
	Increased production opportunities are delayed or lost	Possible	Medium	
	Water sales and charges do not cover the cost of new supply infrastructure	Possible	Low	
	Capacity to pay for water is impacted upon	Possible	Medium	

Identified risks	Risk consequences	Risk likelihood	Risk evaluation	Risk treatments
Stakeholder issues <ul style="list-style-type: none"> Not all stakeholders understand or accept the strategy Some stakeholders resist implementation of the strategy options 	Some stakeholders require review and/or amendment of the strategy	Possible	Medium	Consult with all relevant stakeholders and consider all feedback
	Multi-stakeholder issues are difficult to resolve and impact on strategy implementation	Possible	High	Seek to resolve multi-stakeholder issues as soon as practicable
	New source options are delayed by stakeholder objections	Possible	High	Consult with landholders and interest groups and address concerns

5. Strategy implementation



5.1 Overview

Implementation will involve a number of actions including regular monitoring and review to ensure the strategy remains up to date and risks are minimised.

The implementation of a regional strategy to address the water supply issues in Central Queensland will require a range of activities. Some of the activities that will need to be undertaken as a part of the implementation process include:

- development of more effective water entitlement trading opportunities
- improved water supply system management and water efficiencies
- progression of water supply planning for small communities
- reservation and release of unallocated water
- further investigations of preferred infrastructure options.

These action items are to be progressed through the appropriate water resource management and planning processes and will assist the state and local governments in their future planning.

The initial actions requiring implementation are outlined below. A detailed implementation schedule for the strategy indicating priorities, lead agencies and expected timings for each of the strategy actions is given in Table 4.

Monitoring, review and consultation on the information contained in the strategy, including the main parameters upon which future water demand projections are based, will be undertaken at regular intervals ensuring the strategy is dynamic, up-to-date and flexible.

An investigation of potential institutional arrangements relevant to water supplies from the Lower Fitzroy and Boyne will also need to be undertaken. Appropriate institutional arrangements are required to enable:

- a regional approach to water supply so that potential efficiencies can be realised
- a reduction in risk and liability issues
- an improved certainty for future developments
- key actions required to implement the strategy.

5.2 Maximising the effectiveness of supplies through water trading

Provision will be made in the Fitzroy Basin ROP for the conversion of medium priority water allocations to high priority water allocations to facilitate trading in the Nogoa Mackenzie Water Supply Scheme. To provide for this, a review of the Fitzroy Basin ROP change rules for this scheme will occur through a consultative process to be completed in 2006.

5.3 Maximising the effectiveness of supplies through more efficient use of water

Water demand and efficiency management

Existing urban, industry, and rural demand management and water use efficiency initiatives in the region will continue to be implemented, and new initiatives, at both regional and sub-regional scales, developed.

As part of the ongoing development of the regional water supply strategy for Central Queensland, regional and/or sub-regional water demand and efficiency management plans are to be developed over the next 1 to 2 years. These plans will outline key demand measures and water efficiency activities to be implemented over identified time periods for urban and industrial water use.

It is anticipated that each plan will describe:

- appropriate targets for residential water use for the localities within the plan area, and suitable time periods over which to implement them
- key opportunities and implications for source substitution
- likely successful demand management programs and possible sources of funding for these schemes
- potential integrated urban water management options to better manage existing water resources and reduce impediments to demand management and water efficiency initiatives
- categories of water users that should undertake water efficiency audits and water efficiency management plans to reduce potable water use
- where savings from pressure and leakage reduction programs would be most effective, and the approximate estimated savings from these programs
- an action plan to implement identified actions.

It is intended that development of the plan utilise and build on work done in association with existing and proposed programs rather than duplicating this work.

While the timeframe for development of these plans is 1 to 2 years, the targets for residential water use should be identified during 2006–07.

To assist in the development of the plan/s, a task group of interested local governments, water service providers and state government officers will be established. The task group would regularly review the development of the plan and provide feedback to relevant stakeholders on a regular basis.

The rural water use efficiency initiative will continue to be the vehicle for improving the efficiency of rural water use.

Lower Fitzroy and Boyne River systems

In conjunction with the relevant water service providers in the Lower Fitzroy and Boyne River systems, assessments will be undertaken, particularly economic and hydrologic, to maximise the effectiveness of existing and future supplies through innovative and coordinated management. Critical to these assessments will be the establishment of appropriate levels of service for these water supplies.

The above assessments will include evaluation of options for operating the Lower Fitzroy schemes in conjunction with the Awoonga Dam scheme.

In consultation with the relevant water service providers, appropriate institutional arrangements will be established to allow development and operation of additional water infrastructure in the Lower Fitzroy.

Potential for a future Nathan Dam to provide water supplies to the Lower Fitzroy River area

Hydrologic assessments will be undertaken to determine the effectiveness of a Nathan Dam in providing supplies to the Lower Fitzroy, particularly in critical water supply periods.

Callide Valley groundwater

Groundwater performance issues in the Callide Valley will be addressed as part of a future amendment process to include regulation of groundwater in the Fitzroy Basin Water Resource Plan, commencing in 2006.

5.4 Progression of supply planning for small communities

The Central Queensland Local Government Association will lead, with support from the Department of Natural Resources and Water, the development of solutions to address the water supply needs of small communities.

The study will be undertaken to provide an initial assessment of opportunities for local governments to work collaboratively on solutions such as:

- joint water supply options
- implementing consistent regulations
- encouraging voluntary community adoption of best practice water conservation.

The proposed study will coordinate a regional assessment of water demands in smaller communities and alternatives for meeting the demands. This study will investigate both specific solutions for individual small communities, and generic solutions that may be appropriate for a number of small communities within the study area.

5.5 Reservation or release of unallocated water

Reservation of unallocated water

The strategy provides for the reservation of unallocated water to provide high priority supplies to meet urban, industrial and mining demands in the region.

Following completion of investigations associated with existing and proposed infrastructure in the Boyne and Lower Fitzroy systems, including the development of levels of service for these systems, the Fitzroy Basin ROP may be amended to reserve water in accordance with the following:

- reservation of up to 30 000 ML/a of reliable water from the Lower Fitzroy for urban and industrial purposes for the Gladstone Area Water Board, or other entity that may arise from a review of the institutional arrangements
- reservation of 4000 ML/a of reliable water from the Lower Fitzroy for urban needs on the Capricorn Coast
- reservation of the balance of available water from the Lower Fitzroy (currently estimated to be in the order of 42 000 ML/a of reliable water) for urban, industrial and agricultural purposes in the Lower Fitzroy

- reservation of water for urban and other purposes in other systems in the Fitzroy Basin where unallocated water is available.

The hydrologic investigations for the Boyne and Lower Fitzroy will include investigations of potential linkages:

- between the Awoonga Dam Water Supply Scheme and water supply schemes in the Lower Fitzroy
- between the proposed Nathan Dam and water supply schemes in the Lower Fitzroy.

The above reservations are to be in addition to existing reservations, and releases of unallocated water, currently provided for in the existing water resource and resource operations plans.

The Fitzroy Basin ROP may also be amended to reserve water in association with the proposed infrastructure (like Connors River Dam) following completion of the necessary hydrologic and levels of service investigations, as well as detailed design information and project evaluations including economic, environmental, social and cultural heritage assessments.

In implementing the reservation of unallocated water for urban community needs, it will be necessary to develop methods to calculate community reserves and principles for release of reserved water. As part of the development of the methodology, policy targets for reasonable per capita usage in the region will be required.

Release of unsupplemented water for other water uses

Releases of unsupplemented water will, over time, be made in the Isaac–Connors, Lower Mackenzie–Fitzroy and Upper Dawson sub catchments. The actual timing and process for these releases needs to be determined in consultation with existing and potential water users. In the Isaac–Connors and Lower Mackenzie–Fitzroy sub-regions, it is intended that these releases be made by no later than 2010. A release in the Isaac–Connors and tributaries of the Lower Mackenzie and Fitzroy (excluding Dawson) is planned for 2006. In the Upper Dawson sub catchment, it is intended that the release be made after the details of the Nathan Dam project are finalised.

5.6 Investigations of potential infrastructure developments

Confirmation of the suitability of the Connors River Dam proposal

Development of a dam at the Mt Bridget site on the Connors River is considered to be the preferred option to meet medium to long term high priority needs in the Isaac–Connors area.

Steps will now be taken to ensure there are no ‘fatal flaws’ with this dam site and to provide critical baseline information that will assist detailed impact assessments, specifically:

- geological assessment, including drilling core holes to establish the level and adequacy of foundations for the proposed dam
- assessment of adequate sources of construction materials
- assessment of areas suitable for revegetation
- further assessment of the likely impacts on the Fitzroy River turtle
- further assessment of the likely impacts on fish habitat and fish passage
- appropriate cultural heritage assessment.

Investigation of possible pipelines required to convey supply from the dam to users should be initiated when the location of potential future users is clearer.

Impact assessment studies of the Fitzroy River Weir proposals

For the Fitzroy River Weir proposals, necessary project evaluations will be undertaken including environmental, social, cultural, and economic assessment and evaluation. The outcomes of these investigations will assist the selection of the most appropriate arrangements of this infrastructure, including the size, and any staging of the infrastructure. It is intended that these studies will proceed in 2006–07.

Progress construction of Nathan Dam

The State government will develop a separate implementation plan for Nathan Dam to progress the development process for the dam, including amongst other things, addressing environmental issues and the outstanding approvals processes.

5.7 Monitoring and review

A comprehensive monitoring and review program has been developed to ensure that the strategy remains relevant over the coming years, and to identify if a significant review of the strategy might be necessary in the future.

Significant elements of the monitoring and review program include the following:

- review of the region's water resource plans at 10-yearly intervals, at which time, re-assess the ability of existing and proposed sources to meet demands
- as part of regular water resource plan reviews, re-assess the performance of schemes and improve the definition of performance of water allocation priority groups where practical
- update industry and mining demand projections at 3-yearly intervals, and if updates vary significantly from previous projections, re-assess ability of existing sources to meet the demands
- update urban and agricultural demands at 6-yearly intervals, and if updates vary significantly from previous projections, re-assess ability of existing sources to meet demands
- monitor effectiveness of trading regime in meeting priority needs
- monitor climatic, hydrologic, water quality and ecosystem variables in accordance with existing regulatory requirements
- evaluate state-of-the-environment reports to identify emerging issues.

5.8 Consultation

Whilst this strategy has been developed in consultation with agencies of government and with the assistance of a steering committee comprising representatives of local government, industry and interest groups across the Central Queensland region, a broader program of consultation is now necessary to establish awareness of and understanding of the strategy.

Consultation will need to continue with:

- relevant state government departments
- local governments in the Central Queensland region
- water service providers and water users in the region
- interest groups
- landholders potentially affected by proposed works, storages or pipelines
- the community generally.

5.9 Implementation schedule

A detailed implementation schedule for the strategy indicating priorities, lead agencies and expected timings for each of the strategy actions is given in Table 4 below.

Figure 4: Strategy Implementation

Strategy action	Priority	Lead agency/ agencies	Instrument	Current schedule or trigger
Regional strategies				
Establish a mechanism / process for ongoing monitoring of the implementation of the strategy, including formation of a strategy implementation group to meet on a formal and regular basis, with additional one-off meetings if emerging issues are identified	High	Department of Natural Resources and Water (NRW)	Central Queensland Regional Water Supply Strategy (CQRWSS)	Finalisation of the strategy. Annual report
Reservation of water in association with future proposed infrastructure	High	NRW	ROP amendment	Amendment of ROP follows completion of necessary investigations, including hydrologic, levels of service and detailed infrastructure assessment studies (2006–07)
Reservation of up to 30 000 ML/a of reliable water from the Lower Fitzroy for urban and industrial purposes for the Gladstone Area Water Board (or other entity as may arise from the review of institutional arrangements)	High	NRW	ROP amendment	Amendment of ROP follows completion of necessary investigations, including hydrologic, levels of service and detailed infrastructure assessment studies (2006–07)
Reservation of 4000 ML/a of reliable water from the Lower Fitzroy for urban needs on the Capricorn Coast	High	NRW	ROP amendment	Amendment of ROP follows completion of necessary investigations, including hydrologic, levels of service and detailed infrastructure assessment studies (2006–07)
Reservation of the balance of available water from the Lower Fitzroy for urban, industrial and agricultural purposes in the Lower Fitzroy	High	NRW	ROP amendment	Amendment of ROP follows completion of necessary investigations, including hydrologic, levels of service and detailed infrastructure assessment studies (2006–07)
Progress a review of institutional arrangements in the Lower Fitzroy (including Waterpark Creek) and Boyne rivers systems	High	NRW; The Coordinator-General; Existing water service providers in this area	Water Act	2006–07
Develop process to progress development of identified infrastructure and release of associated water allocation	High	The Coordinator-General; NRW	State policy	2006–07
Maximising the effectiveness of supplies through water trading e.g. <ul style="list-style-type: none"> review of change rules in Nogoa–Mackenzie 	High	NRW	ROP amendment	Release draft ROP amendment mid 2006 Finalise ROP amendment late 2006

Strategy action	Priority	Lead agency/ agencies	Instrument	Current schedule or trigger
Regional strategies				
Maximising the effectiveness of supplies through water trading e.g. <ul style="list-style-type: none"> review of change rules in other areas 	Low	NRW	ROP amendments	When significant interest from water users is evident
Maximising the effectiveness of supplies through continuing implementation of existing demand and water efficiency initiatives and exploring development of new initiatives for demand management at regional and sub-regional scale	High	Local governments, Fitzroy River Water, GAWB, and SunWater in consultation with NRW, EPA and Local Government Planning Sports and Recreation (LGPSR)	State-wide policy, Water Act	Water Demand and Efficiency Management Plans completed by end of 2007–08. Water use targets identified by end of 2006–07
Maximising the effectiveness of supplies through improved management	High	Water service providers, in consultation with NRW	ROP amendments	A number of studies are current or proposed
Maximising the effectiveness of supplies through drought management planning	High	Water service providers	Water Act	2006–07
Release of unsupplemented unallocated water	Medium- High	NRW	Market based release for tradable water allocations and water licences	As per sub-regional strategies
Increasing water supplies through additional water supply sources	High	The Coordinator-General	Formal appointment of developers, commitment to make water allocations	As per sub-regional strategies
Release of water reserved in association with infrastructure	High	NRW	ROP amendment	Once final project design has been confirmed and necessary approvals obtained for the infrastructure
Urban communities strategy				
Progress state-wide policy relating to targets for urban water use and reservation of water for community urban needs	High	NRW	State policy document	Ongoing during 2006–07
Progress state-wide policy development to address affordability of water for urban community needs	High	LGPSR; Treasury; NRW; Local Government Association of Queensland	State-wide policy	2006–07
Investigate potential for improvements in the allocation security and supply regime for towns supplied by mining companies in the Isaac–Connors, Upper Mackenzie and Comet areas	High	NRW; Local Governments; Relevant mining companies	Water Act; Local Government Act	2006–07
Coordinate small communities planning study	High	Water Directorate-Central Queensland Local Government Association (CQLGA), with support from NRW and LGPSR	Agreement between CQLGA and State Government	Commencing in 2006

Strategy action	Priority	Lead agency/ agencies	Instrument	Current schedule or trigger
Sub-regional strategy				
<i>Isaac–Connors</i>				
Construction of Burdekin–Moranbah Pipeline	High	SunWater	Commercial project by SunWater	2006–07
Release of between 6000 and 8000 ML of unsupplemented water (in the Isaac–Connors and tributaries of the Lower Mackenzie and of the Fitzroy River)	High	NRW	ROP and water licence	2006–07
Release of between 4000 and 6000 ML of unsupplemented water, including overland flow (in the Isaac–Connors and tributaries of the Lower Mackenzie and of the Fitzroy River)	Medium	NRW	ROP amendment and water licence	2007–08
Undertake studies to confirm no 'fatal flaws' associated with the Connors River Dam option	High	NRW; Coordinator-General	CQRWSS	2006–07
Detailed planning and approvals for Connors River Dam option	High	NRW; Coordinator-General	CQRWSS	If the above studies indicate no fatal flaws, the proposal should be progressed to a stage where, if required, it could be developed in the least possible timeframe
Construction of a dam at the Mt Bridget site on the Connors River	Medium-High	Proponent (facilitated by Coordinator-General)	State Development and Public Works Organisation Act and Water Act	Construction to commence with sufficient lead time to enable commercial operation of the infrastructure when anticipated demands approach available supplies
Construction of a pipeline/s from Connors River Dam	Medium-High	Proponent (facilitated by Coordinator-General)	State Development and Public Works Organisation Act and Water Act	Construction to commence with sufficient lead time to enable commercial operation of the infrastructure when anticipated demands approach available supplies
Develop management options for the groundwater systems, including Braeside Borefield	High	NRW	Water Act and/or WRP amendment/ ROP amendment	As part of the Department's ongoing water management role. Management options determined in 2006–07
<i>Lower Mackenzie–Fitzroy</i>				
Detailed assessment studies of Eden Bann Weir raising and of Rookwood Weir	High	NRW	CQRWSS	2006–07
Assess options to maximise effectiveness of supplies in the Lower Fitzroy and Awoonga Dam including addressing performance shortfalls during critical water supply periods	High	Fitzroy River Water; Gladstone Area Water Board; SunWater; NRW	CQRWSS	2006–07
Development of appropriate levels of service for water supplies associated with the Lower Fitzroy schemes and Awoonga Dam	High	Local Governments, Fitzroy River Water, GAWB, SunWater, NRW	Water Act	2006–07
Raising of Eden Bann Weir	High	Proponent (facilitated by Coordinator-General)	State Development and Public Works Organisation Act and Water Act	Complete 2011 (size and staging to be determined)

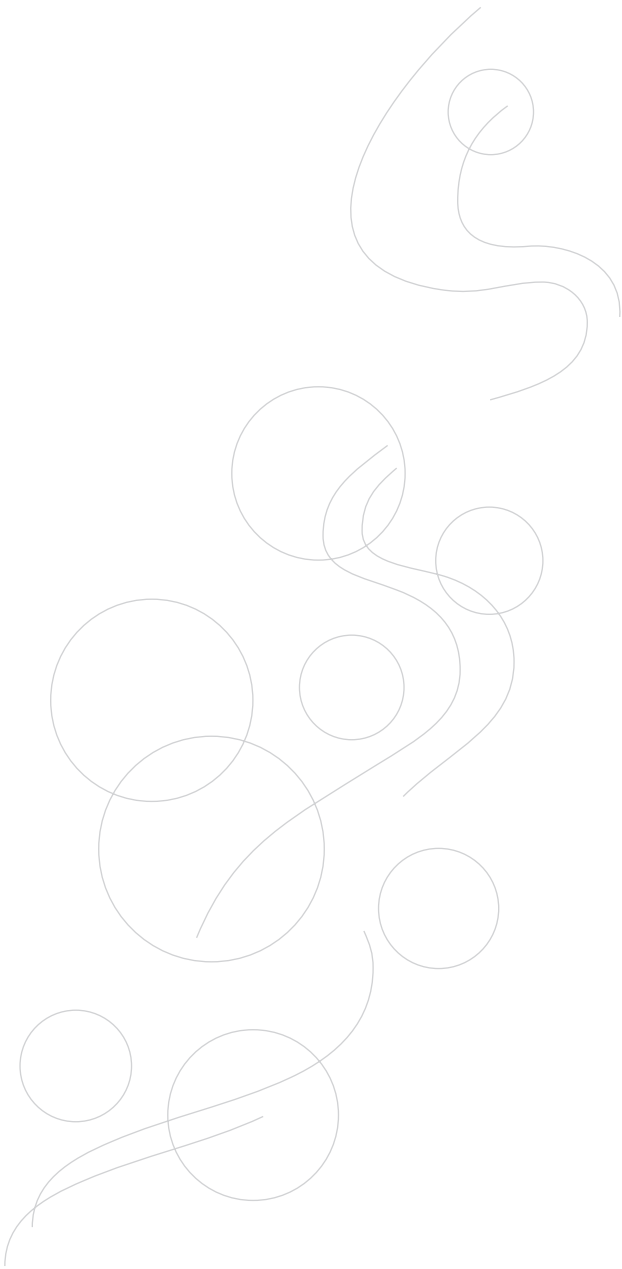
Strategy action	Priority	Lead agency/ agencies	Instrument	Current schedule or trigger
Sub-regional strategy				
<i>Lower Mackenzie–Fitzroy</i>				
Construction of Rookwood Weir	High	Proponent (facilitated by Coordinator- General)	State Development and Public Works Organisation Act and Water Act	Complete 2011 (size and staging to be determined)
Release of 8000 ML nominal volume of unsupplemented water allocation in the Lower Mackenzie	Low	NRW	ROP	When significant interest by potential water users is demonstrated
Construction of pipeline and associated infrastructure from Fitzroy River Barrage to the Capricorn Coast.	High	Livingstone Shire Council	State Development and Public Works Organisation Act/ Agreement between council and relevant water service provider	Commencement of project in 2006–07
<i>Dawson–Callide Valley</i>				
Investigate potential for Nathan Dam to supply Lower Fitzroy in critical water supply periods	High	NRW; Coordinator- General	CQRWSS	2006–07
Construction of Nathan Dam	High	Proponent (facilitated by Coordinator- General)	State Development and Public Works Act and Water Act	When impact assessment studies are completed, outstanding approvals have been obtained and the project is assessed as commercially viable
Address groundwater performance issues - Callide Valley	High	NRW	WRP amendment, ROP amendment	Commencing in 2006
Raising of Glebe Weir	Low	SunWater; Proponent	Water Act, WRP amendment, ROP amendment	When assessed as commercially viable and if Nathan Dam does not proceed
<i>Upper Dawson</i>				
Release of unsupplemented water	Medium	NRW	ROP amendment and water licence	When details of the Nathan Dam project has been finalised
<i>Gladstone</i>				
Construction of a pipeline from the Fitzroy River Barrage to Gladstone	High	GAWB (or other entity if agreed through review of institutional arrangements)	State Development and Public Works Organisation Act and Water Act	When assessed as commercially viable
<i>Comet–Nogoa–Mackenzie</i>				
Review of change rules for medium to high priority allocations to allow for conversion of water allocations if required and introduce a more flexible trading regime	High	NRW	ROP amendment	Release draft ROP amendment mid 2006 Finalise ROP amendment late 2006

Strategy action	Priority	Lead agency/ agencies	Instrument	Current schedule or trigger
Strategy monitoring and review				
<i>Climate</i>				
Continue collection and analysis of meteorologic, hydrologic and environmental data	High	Bureau of Meteorology (BOM), NRW and EPA	Monitoring and reporting requirements, ROP and others	Continuing
Complete review of region's water resource plans at 10-yearly intervals	High	NRW	Water Act	Commencing in 2007
Re-assess ability of existing sources to meet existing demands at 10-yearly intervals	Medium	NRW; water service providers	Review of WRP's, ROP's and CQRWSS	Commencing in 2010
Re-assess ability of new source options to meet demands in terms of adequacy of volume and performance at 10-yearly intervals	Medium	NRW	As above	Commencing in 2015 for Fitzroy region or dependent on significant new information
<i>Water demands</i>				
Update industry and mining demand projections at 3-yearly intervals, or more frequently if need arises	High	NRW	CQRWSS	Commencing in 2009
Update urban and rural demand projections at 6-yearly intervals, or more frequently if need arises	Medium	NRW, DPI&F	CQRWSS	Commencing in 2012
Re-assess ability of existing sources to meet industry and mining demands at 3-yearly intervals (in terms of supply volume and performance)	High	NRW; water service providers	CQRWSS	Commencing in 2009 if up-dates vary significantly from projections
Re-assess ability of existing sources to meet urban and rural demands in terms of supply volume and performance at 6-yearly intervals or more frequently if need arises	Medium	NRW; water service providers	CQRWSS	Commencing in 2012 if up-dates vary significantly from projections
<i>Availability of supply</i>				
Maintain incentives for water service providers to improve water supply	High	NRW; LGPSR; water service providers	Total Management Plans; State guidelines including performance targets	On-going
Maintain incentives for water users to improve water use practices including water re-use	High	State and local governments; water users	State and local government incentive initiatives; state guidelines	On-going
Monitor water supply improvements and water use savings	Medium	NRW; Local governments; water service providers	Incentive scheme obligations; Annual local government reporting	On-going
Undertake sufficient assessments of new source options to establish appropriate certainty regarding development timeframes	High-Medium	NRW	State Development and Public Works Organisation Act	As per Isaac-Connors and Lower Mackenzie-Fitzroy sub-regional strategies

Strategy action	Priority	Lead agency/ agencies	Instrument	Current schedule or trigger
Strategy monitoring and review				
<i>Availability of supply</i>				
Progress the streamlining of water reporting requirements for efficient collection, storing and reporting of water service provider data (Statewide Water Information Management – SWIM Project)	High	LGPSR	The appropriate state legislation – to be determined as part of the project	2006–07
Monitor effectiveness of trading regime in meeting priority needs	Medium	NRW	Water Act	Ongoing
Amend ROP as necessary to address significant restraints to trade	Medium	NRW	Water Act	As required to address identified significant restraints
Initiate and manage process for development of new sources of supply in a timely and effective way	High	The Coordinator-General	State Development and Public Works Organisation Act and Water Act	As per triggers in sub-regional strategies
<i>Environmental issues</i>				
Continue state water quality and ecosystem monitoring	High	NRW	ROP	Ongoing as per the ROPs
Continue water quality and ecosystem monitoring at and downstream of existing storages	High	Fitzroy and Boyne Basin Resource Operations Licence holders	ROP	Ongoing as per the ROPs
Commence water quality and ecosystem monitoring at proposed new source options	Medium	NRW	Water Act	Commencing 2006–07
Evaluate state of the environment reports to identify emerging issues as soon as practicable, and determine appropriate response	Medium	NRW, EPA	CQRWSS	Ongoing
<i>Cultural issues</i>				
Undertake indigenous cultural heritage assessments for proposed new infrastructure	High	NRW, The Coordinator General, Proponent, and indigenous stakeholders	Various State and Commonwealth Legislation	Appropriately in advance of each development
Undertake non indigenous cultural heritage assessments for proposed new infrastructure	High	NRW, The Coordinator General, Proponent and stakeholders	Various State and Commonwealth Legislation	Appropriately in advance of each development
<i>Social issues</i>				
Fully inform landholders in proposed new source areas of possible impacts and their timing	High	NRW	CQRWSS	2006 and as required
Monitor property values in areas of possible impact	Medium	NRW	CQRWSS	Ongoing
Address landholder concerns in project development phase e.g. access	Medium	The Coordinator-General	State Development and Public Works Organisation Act	Appropriately in advance of each development

Strategy action	Priority	Lead agency/ agencies	Instrument	Current schedule or trigger
Strategy monitoring and review				
<i>Economic and financial issues</i>				
Maximise certainty (and minimise risks) for the development of necessary new water sources adequately in advance of needs	High	The Coordinator-General	State Development and Public Works Organisation Act	Appropriately in advance of each development
Minimise risk of funding shortfalls; consider need for community service obligations	High	The Coordinator-General, Treasury	Treasury Guidelines, State Development and Public Works Organisation Act	Appropriately in advance of each development
Strategy review				
Comprehensive strategy review	Low	NRW in consultation with key stakeholders	CQRWSS	Commence when monitoring and assessment actions detailed above suggest that comprehensive review of the strategy is required or by 2018

6. Further reading

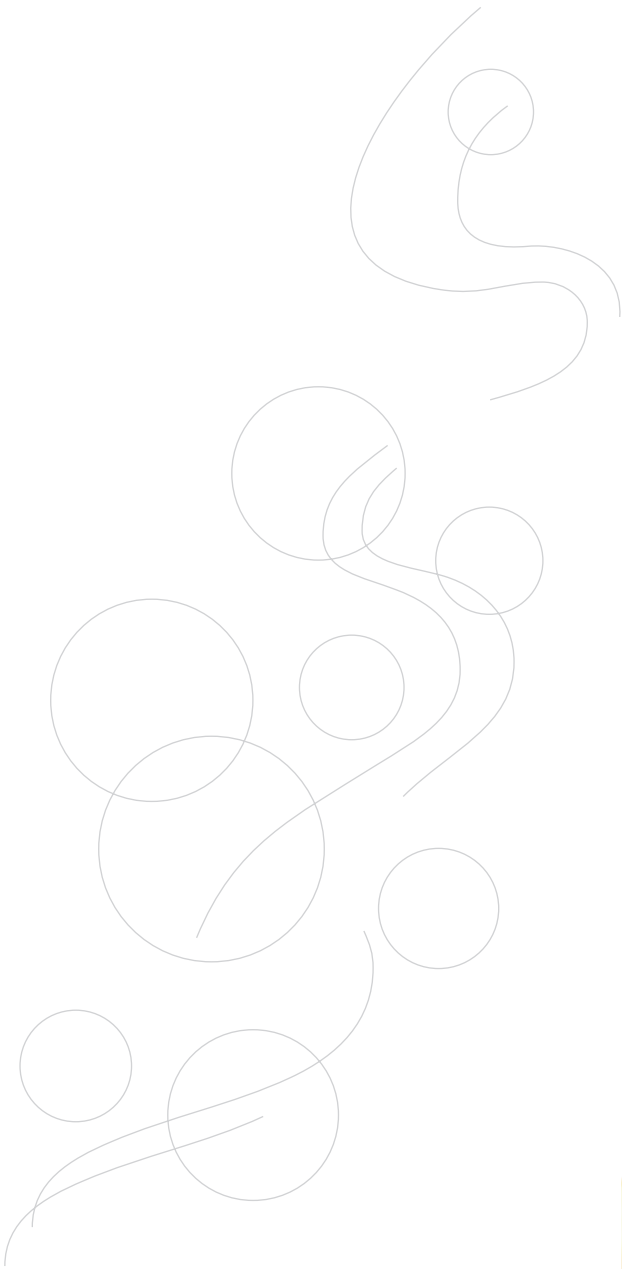


Further reading

The following list of Department of Natural Resources and Water publications may be of interest to readers who wish to obtain further information about water reform and water planning, particularly as it relates to Central Queensland. The list includes documents which provide general background information about water reform in Queensland, as well as documents relating to water planning in Central Queensland. The document titled Central Queensland Regional Water Supply Study Report 2005 formed the basis for the development of the strategy.

- Central Queensland Regional Water Supply Study Report, 2005
www.cqwaterstrategy.qld.gov.au/documentation
- Fitzroy Basin Resource Operations Plan, 2004
www.nrm.qld.gov.au/wrp/fitzroy_rop.html
- Fitzroy Basin Water Resource Plan, 1999
www.nrm.qld.gov.au/wrp/fitzroy.html
- Boyne River Basin Resource Operations Plan, 2003
www.nrm.qld.gov.au/wrp/pdf/boyne/boyne_rop.pdf
- Boyne River Basin Water Resource Plan, 2000
www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WatResBRPoo.pdf
- Queensland Water Plan 2005–10 – An action plan to meet our future water needs, August 2005
www.nrm.qld.gov.au/water/pdf/qld_water_plan_05_10.pdf
- Climate Change: Climate Smart Adaptation
www.longpaddock.qld.gov.au/ClimateChanges/
- Fact sheets
www.nrm.qld.gov.au/factsheets/index.php
 - W75 Water reform: striking a balance
 - W76 Water trading
 - W74 Water resource planning

7. Key terms and concepts



Key terms and concepts

Demand management:

any program that decreases the level and / or delays the timing of demand for water to meet current and projected needs. Demand management programs may include:

Increasing system efficiency:

Examples: flow analysis and pressure monitoring; leak detection and leak repair; changes in system operation such as pressure reduction.

Increasing end use efficiency:

Examples: use of water efficient appliances, devices and processes.

Improving the market in water use:

Examples: universal metering and cost reflective pricing; education campaigns; water audits.

Promoting distributed sources of supply:

Examples: stormwater harvesting; encouraging water sensitive urban design; industrial, community and agricultural effluent reuse initiatives.

Substitution of resource use:

Examples: Air-cooling, saltwater cooling, desalination.

Rural water use efficiency measures:

Examples: Farm design, crop selection, on-farm storage and channel loss reduction, tailwater recycling.

Environmental flow objective:

an objective for the protection of the health of natural ecosystems for the achievement of ecological outcomes. The environmental flow objectives are specified in water resource plans. For the Fitzroy Basin Water Resource Plan, these objectives relate to first post winter flows, seasonal base flows and medium to high flows.

High priority:

a water allocation that has a relatively high level of performance when compared to medium priority water allocations. High priority water allocations are mostly used for urban and industrial purposes, although they are also sometimes used for irrigation, particularly for high value, long lived crops such as fruit trees.

Levels of service:

the frequency, duration and severity of water restrictions that would be experienced by the community on average over the long term.

Medium Priority:

a water allocation having a relatively lower level of performance compared to high priority water allocations. Medium priority water allocations are generally used for irrigation purposes.

Overland flow:

water, including floodwater, flowing over land, other than in a watercourse or lake:

- a) after having fallen as rain or in any other way
- or
- b) after rising to the surface naturally from underground.

Overland flow water does not include:

- a) water that has naturally infiltrated the soil in normal farming operations, including infiltration that has occurred in farming activity such as clearing, replanting and broadacre ploughing
- or
- b) tailwater from irrigation if the tailwater recycling meets best practice requirements
- or
- c) water collected from roofs for rainwater tanks.

Performance:

The performance of a water supply in terms of its suitability for an intended use, considered in terms of a number of key attributes including, for example, the severity, frequency and duration of restrictions.

Resource Operations Plan (ROP):

is a plan that details the operating rules for water infrastructure and other management rules that will be applied in the day-to-day management of water supplies.

A ROP might address, among other things:

- the conversion of water entitlements to tradable water allocations
- the process and location in which water allocations will be traded
- the process for release or reservation of unallocated water that is identified in the corresponding water resource plan
- the detailed operating rules for infrastructure operators so management of dams and weirs complies with the water resource plan's objectives for water users and the environment
- the detailed practices needed to meet the monitoring and reporting requirements specified in the water resource plan.

Supplemented water:

water supplied from a major water supply scheme, for example, the Fitzroy Barrage, Lower Fitzroy (Eden Bann Weir) and Nogoa Mackenzie (Fairbairn Dam) water supply schemes. The supply of this water is managed by a water service provider, such as, for example, SunWater or Fitzroy River Water.

Unallocated water:

water that it is possible to make available for future consumptive use by urban, rural or industrial sectors without compromising the environment or the security of supply to existing water users.

Unsupplemented water:

water not supplied from a major water supply scheme. The Department of Natural Resources and Water manages unsupplemented water. Unsupplemented water includes water taken under high flow conditions (traditionally known as waterharvesting).

Water allocation:

a water allocation is an entitlement established through a resource operations plan. Water allocations are tradable separate to land according to limits and rules defined in a resource operations plan. In a trading market, water allocations can be bought, sold or leased, in part or full, permanently or temporarily.

The water allocation holder's details and specifications for water allocations are recorded on a water allocation register, similar to the existing system for registering land titles.

Waterharvesting:

the taking of unsupplemented water during specified high flow events, and generally involves storing the water off-stream for later use.

Water entitlement:

is a general term for a range of different types of authorisations to take water, including water allocations and water licences.

Water licence:

a water licence is for the taking of water or interfering with the flow of water. Unlike water allocations, water licences are not tradable separate to land.

Water Resource Plan (WRP):

is subordinate legislation under the Water Act and details the plan area, water to which the plan applies and what the plan aims to achieve.

The water resource plan identifies:

- water allocation security objectives (WASOs)
- environmental flow objectives (EFOs).

Water trading:

prior to recent reforms, water licences were tied to the land. Now water allocations, which are established through a resource operations plan, can be bought and sold separately from land. Water trading promotes higher efficiency because water users can sell any surpluses they create through a market process to others who place a higher value on it. Water licences cannot be traded separately from land.