



Emerald

regional water supply security assessment

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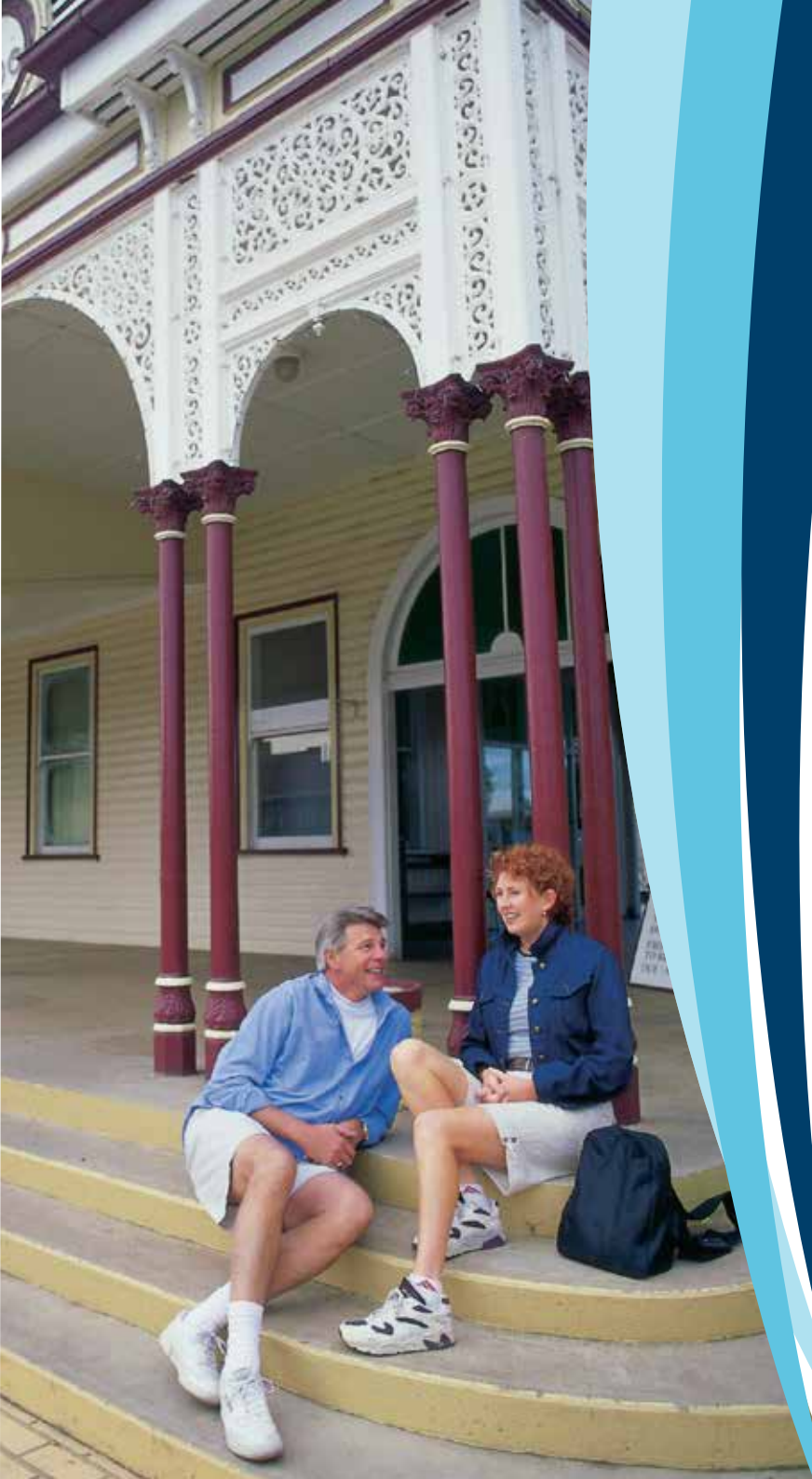
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Introduction

Emerald is a growing community of about 16 000 in the heart of Central Queensland—a region that continues to play a significant role in supporting Queensland’s economy. Extensive agricultural production (including cotton and citrus) dominates the area south and west of Emerald, and some of the state’s most productive coalmines lie to the north and east in the Bowen Basin.

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Emerald’s population is projected to grow from around 16 000 to about 25 000 by 2036 (Queensland Government Statistician’s Office). Safe, secure and reliable water supplies are an essential resource for the health and wellbeing of the Emerald community, and contribute to its capacity to encourage and support economic growth and development.

The Central Highlands Regional Council is the registered water service provider for Emerald’s urban water supply, and provides both water supply and wastewater services to most urban areas in Emerald.

The Department of Energy and Water Supply and council committed to a partnership to investigate and establish a shared understanding of the existing security of Emerald’s water supply system and its capacity to support current demand and future growth.

Arising from this partnership, this regional water supply security assessment (RWSSA) provides valuable information to the community and water supply planners about Emerald’s urban water supply security, thereby providing a foundation for future water supply planning by council.

The RWSSA presents a description of the bulk water supply system, current and future water use, and the likelihood of Emerald potentially experiencing water supply restrictions and water supply shortfalls both now and into the future. It is important to note that information presented in the assessment does not consider any changes to the capacity of the existing water supply system and associated infrastructure, nor does it specifically consider any potential climate change impacts on catchment hydrology.



Emerald's water supply sources

Emerald is supplied from the Nogoa Mackenzie Water Supply Scheme (Nogoa Mackenzie WSS), which sources water from Fairbairn Dam (Lake Maraboon). Fairbairn Dam is located 20 km south-west of Emerald, is owned by SunWater and is operated in accordance with the *Fitzroy Basin resource operations plan 2014*.

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Nogoa Mackenzie Water Supply Scheme

Currently, 46 796 megalitres per annum (ML/a) of high priority (HP) water allocations and 183 724 ML/a of medium priority (MP) water allocations are authorised to be taken from the Nogoa Mackenzie WSS. The majority of the water is used by agricultural businesses across the Central Highlands area, with council's supplies from the Nogoa Mackenzie WSS representing only a small component (less than 4%) of the overall scheme's available supplies.

The water supply capability of the Nogoa Mackenzie WSS is primarily supported by releases of water from Fairbairn Dam—either directly to water allocation holders or to a series of smaller weirs downstream of the dam. Fairbairn Dam has a catchment area of 16 317 km², bounded by the Buckland Ranges in the south and the Drummond Ranges in the west. Supported by its large catchment, the dam is the second largest water storage in Queensland, with a full supply volume of 1 301 000 ML and a minimum operating volume of 12 300 ML.

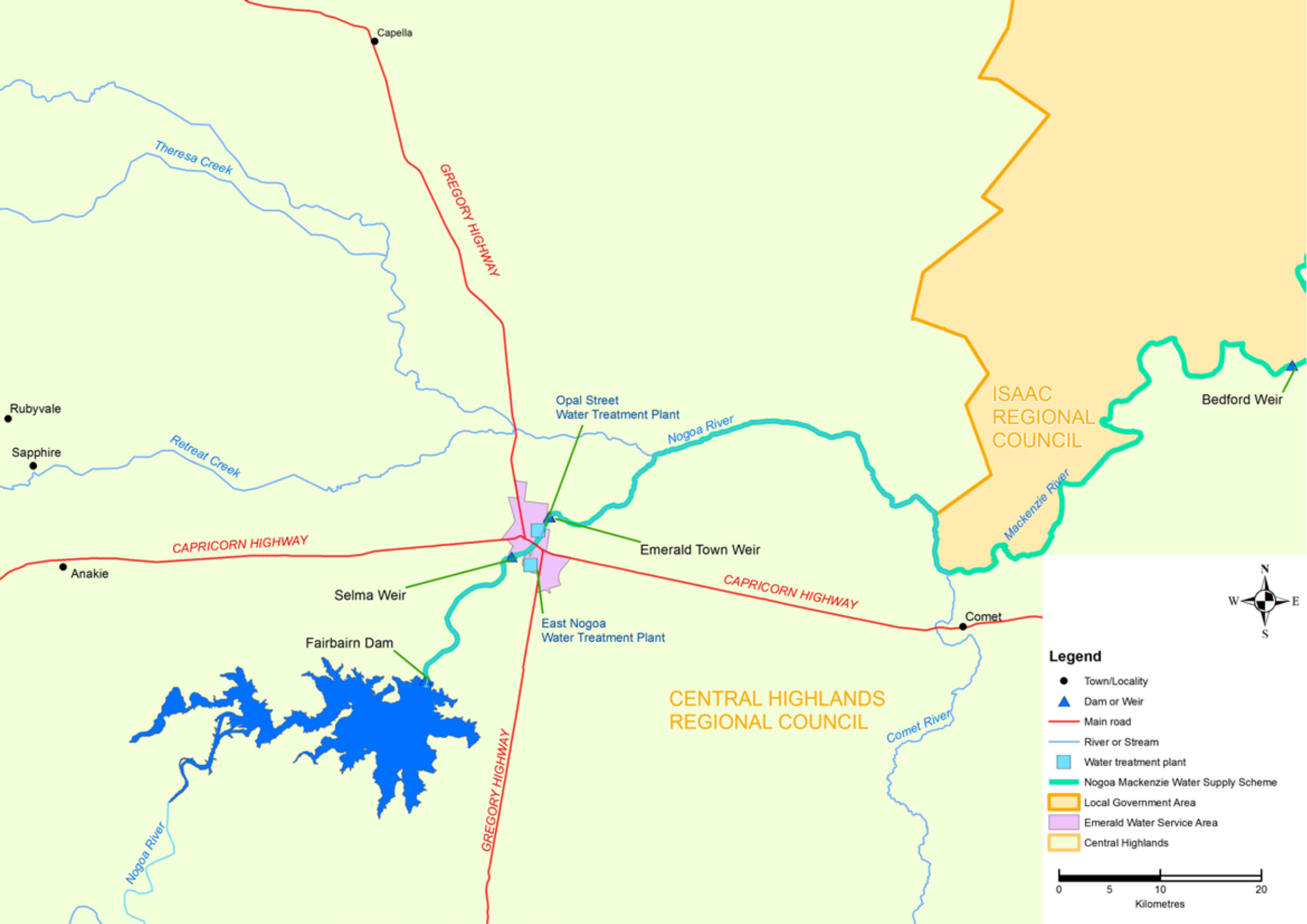
In total, council holds 8547 ML/a of the HP allocations from the Nogoa Mackenzie WSS, of which 5700 ML/a is currently nominally assigned by council for supply to Emerald. Council also holds other water entitlements that, together with the balance of its Nogoa Mackenzie water allocations, are used to supply other communities in the region.

All of Emerald's water supply from the Nogoa Mackenzie WSS is extracted from the Nogoa River at either Selma Weir or Town Weir. Council treats water taken from Selma Weir at the East Nogoa Water Treatment Plant and water taken from the Town Weir at the Emerald Water Treatment Plant on Opal Street (see Figure 1).

Other water supplies

Emerald is wholly reliant on the surface water it sources from the Nogoa Mackenzie WSS for its town water supply and currently has no 'backup' supply options. Groundwater in and around Emerald has high salinity levels and is not suitable quality for a town water supply or most agricultural purposes without significant treatment.

Figure 1: Emerald area map and associated water supply infrastructure





Water users and water use

Emerald's reticulation network currently provides water to approximately 16 000 people, as well as for commercial, industrial and municipal uses such as public parks.

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Emerald reticulation network

The total volume of water sourced from the Nogoa Mackenzie WSS to meet demand on Emerald's reticulation network between 2009–10 and 2014–15 averaged about 4157 ML/a, ranging from a low of 2917 ML in 2010–11 to a high of 4804 ML in 2014–15.

Recycled water

A significant proportion of the water supplied through Emerald's reticulation system is ultimately returned to Emerald's wastewater treatment plants as wastewater after it has been used (for showers, laundry, etc.) and where it is subsequently recycled. Emerald's wastewater treatment plants produced between 1064 ML and 1319 ML of recycled water per year from 2011–12 to 2014–15. This means that, on average, around one-quarter of the water supplied to meet Emerald's urban demands is subsequently recycled. The recycled water produced is used for agriculture.

Water demand varies with the climate

Urban water demand varies from month to month and from year to year depending on various factors, including climatic conditions such as rainfall patterns and volumes, with higher demand usually occurring in hotter, drier periods.

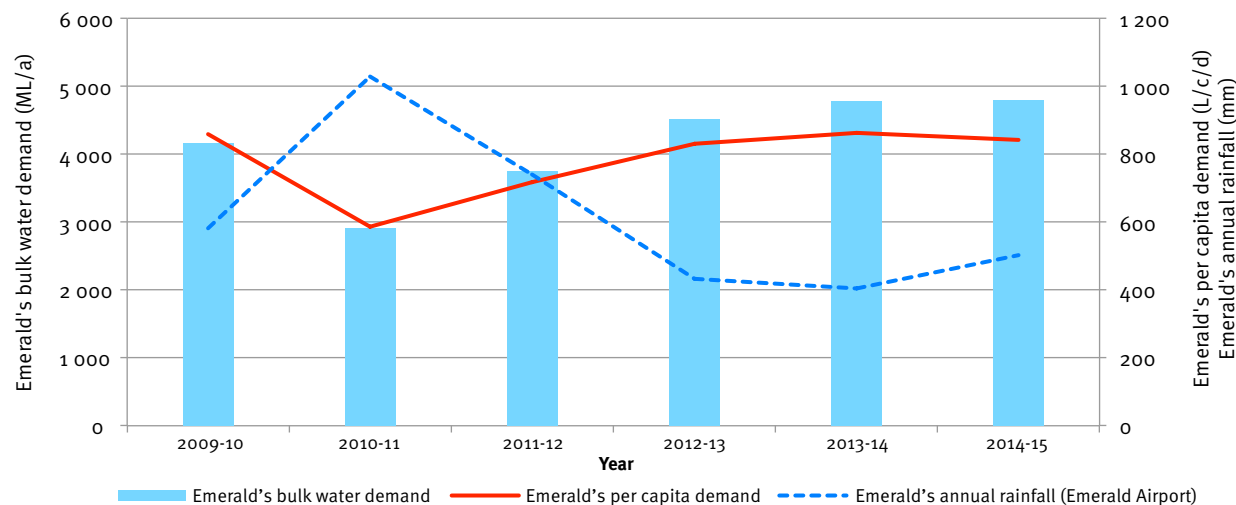


Figure 2: Emerald's bulk water demand and rainfall

Figure 2 shows Emerald's bulk water demand (i.e. the total volume of water sourced annually for Emerald from the Nogoa Mackenzie WSS over the period 2009–10 to 2014–15) and compares this demand with rainfall at the Emerald Airport weather station. Based on the total volume of water sourced and the serviced population, Emerald's average demand on the Nogoa Mackenzie WSS during this period was 785 litres per capita per day (L/c/d), ranging from a low of 586 L/c/d in 2010–11 to a high of 862 L/c/d in 2013–14. During this period, the volume of water supplied solely for residential use averaged 533 litres per person per day (L/p/d).

Table 1 shows recent and longer term annual rainfall data for Emerald. The recent record is taken from the Emerald Airport station (no. 035264), while the longer term record combines data from the old Emerald Post Office station records (no. 035027), which closed in 1992–93, and from the Emerald Airport station (no. 035264). Comparison of the recent and longer term records shows that recent median annual rainfall in Emerald has been about 10% lower than the longer term median.

Table 1: Emerald's rainfall record

	Recent record	Long-term record
	2009–10 to 2014–15	1883 84 to 2014 15
Maximum recorded annual rainfall	1028 mm	1321 mm
Median annual rainfall	542 mm	595 mm
Minimum recorded annual rainfall	403 mm	219 mm



Water restrictions

Council has a framework of permanent water conservation measures and water restrictions that aim to reduce water consumption and extend the duration of the available supplies to Emerald during prolonged dry periods. Council can impose water restrictions for Emerald in response to drought or other temporary water shortage events.

Council has maintained its current water restriction regime for several years, and the hydrologic assessments conducted for the RWSSA include the application of this regime to Emerald's water supply. Council's water restrictions were originally developed based on 'equivalent persons' (EP) usage and restriction triggers based on the volume of water stored in Fairbairn Dam. The RWSSA uses 'per capita' demand and 'per person' demand—see the box (right) for a detailed explanation. For the purposes of the RWSSA, the EP values were recalibrated to per capita demands, as shown in Table 2.

Table 2: Central Highlands' water restriction program

Restriction level	Permanent water conservation measures	Level 1	Level 2	Level 3	Level 4
Fairbairn Dam level (full supply volume)	> 15%	> 12–15%	> 10–12%	> 8–10%	≤ 8%
Council's drought management plan (targeted maximum daily use)	639 L/EP/d	511 L/EP/d	409 L/EP/d	327 L/EP/d	262 L/EP/d
RWSSA (assumed average use)	800 L/c/d	640 L/c/d	512 L/c/d	408 L/c/d	328 L/c/d
Demand reduction		20%	36%	49%	59%

Note: Trigger levels and reduction targets may be reviewed by Central Highlands Regional Council.

Litres per person per day (L/p/d): L/p/d residential water use is calculated as the average daily volume of water used only for residential purposes divided by the serviced population. The serviced population comprises the resident population only.

Litres per capita per day (L/c/d): L/c/d water use is calculated as the average daily volume of bulk water sourced for all of Emerald's water requirements divided by Emerald's serviced population. This includes all residential, commercial, industrial and municipal water use, including water use associated with Emerald's non resident population (such as tourists and temporary workforces) along with any treatment and distribution losses. The serviced population still comprises the resident population only.

Litres per equivalent person per day (L/EP/d): A number of council's planning documents use the 'equivalent persons' or 'EP' measure. This approach assigns water demand where it is used, with parks, fire hydrants, etc. given a value based on the assumed use of a single person. It is important to understand that EP is not a direct measure of actual population in these cases. Therefore, when the different RWSSA and council measures are viewed side by side, such as in Table 2, daily water demands differ because the council assessments use a relatively higher number of 'equivalent persons' (each associated with a relatively smaller demand) when compared with the RWSSA's per capita demand methods described above.



Other uses

Urban

The combined residential population of all of the towns that are or may potentially be serviced by the Nogoa Mackenzie WSS, including Emerald, is currently about 30 000 people.

Council currently holds 8547 ML/a of water entitlements in the Nogoa Mackenzie WSS to meet its communities' water needs. In addition to Emerald, other towns in the Central Highlands (including Blackwater, Bluff and Tieri) obtain their water supply from the Nogoa Mackenzie WSS. Nominally, council currently assigns 2847 ML/a to meet water demand in these towns. Capella and Dingo may also source water from the Nogoa Mackenzie WSS when their local water sources cannot meet demand.

Over the period 2009–10 to 2014–15, average urban use on the Nogoa Mackenzie WSS across the Central Highlands was around 5700 ML/a—just under 4% of the total bulk water use of the scheme. This includes an average use of 4157 ML/a for Emerald.

The towns of Dysart and Middelmount in the neighbouring Isaac Regional Council also sourced an average 1840 ML/a from the scheme (through a separate allocation) over the period 2009–10 to 2014–15.

Agriculture

Agriculture is an important part of the Central Highlands regional economy and is characterised by high-productivity grazing land, extensive cropping and large areas of horticulture.

Actual water use from year to year is heavily influenced by the amount and timing of rainfall compared with crop water requirements and availability of water from the Nogoa Mackenzie WSS. Nonetheless, the agricultural sector is by far the largest user of water from the Nogoa Mackenzie WSS, holding around 160 000 ML (70%) of the total available water allocation and using an average 120 000 ML/a (80% of total average annual water use from the Nogoa Mackenzie WSS). Roughly two-thirds of this water demand occurs close to Emerald, where the Emerald Channel Irrigation Scheme services about 150 irrigators over 15 000 hectares.

Gross value of total agricultural produce in 2010–11 in the Central Highlands was about \$380 million, including cattle and calves (\$208 million), significant cropping of cereals (\$91.7 million), cotton (\$64.7 million), chickpeas (\$30.8 million) and horticulture (\$54 million). Beef feedlots, piggeries and egg and poultry production are significant economic activities in the region and are complementary to other significant agricultural activities, such as extensive grazing and cropping.

Most of the Nogoa Mackenzie WSS water allocations used for agricultural production are MP allocations, although some HP water allocations are also used. Rules in the *Fitzroy Basin resource operations plan 2014* specify how water is shared among MP and HP water allocations for the Nogoa Mackenzie WSS. These include specification of announced allocations rules, which apportion the water available in any given year, expressed in terms of a percentage of a water allocation. As a result, during periods when the volume of water stored in Fairbairn Dam is low, water supplies from MP water allocations may only be partially available or not available at all.

Industry and mining

Mining provides around one-quarter of all employment in Emerald and, holding about 30 000 ML/a of HP water allocations from the Nogoa Mackenzie WSS, is a significant user of water. Over the past eight years, mining and industrial use of water from the Nogoa Mackenzie WSS averaged around 23 000 ML/a. This represents around 15% of total annual water use from the Nogoa Mackenzie WSS during that period. Many industrial customers have reviewed their own water use to ensure they operate efficiently.

In addition, there are a number of council customers that source water through the Emerald network for construction, retail, education, accommodation and food services. Although they are also significant industries in Emerald, they are not major water users.

Figure 3 shows the relative proportion of each sector's demand on the Nogoa Mackenzie WSS over the last eight years. The water use by SunWater mostly reflects losses incurred by SunWater in providing supplies from the irrigation channels and pipelines. The urban demand includes industry demands supplied via the town water supply networks.

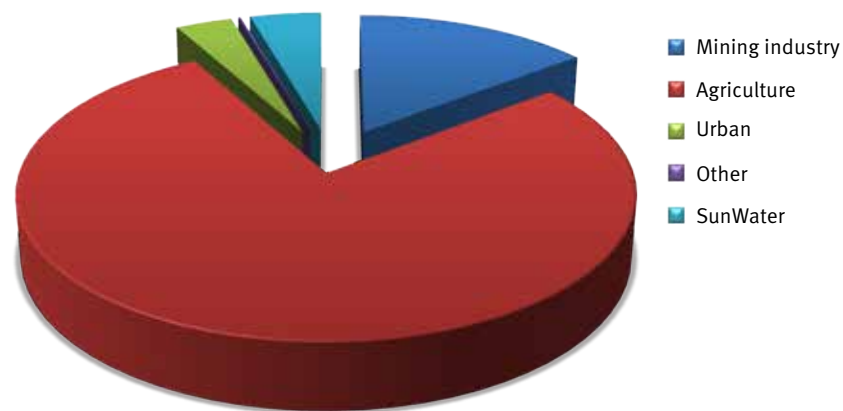


Figure 3: Relative demand of each sector on the Nogoa Mackenzie WSS (2007–08 to 2014–15)





Historical performance of Fairbairn Dam

Figure 4 shows the recorded storage behaviour for Fairbairn Dam from 1973 to 2015.

Among other things, Figure 4 shows that Fairbairn Dam has experienced several extended periods of low inflows, resulting in significant drawdown of the storage to low levels. However, it also shows that, to date, the dam has not reached its minimum operating level.

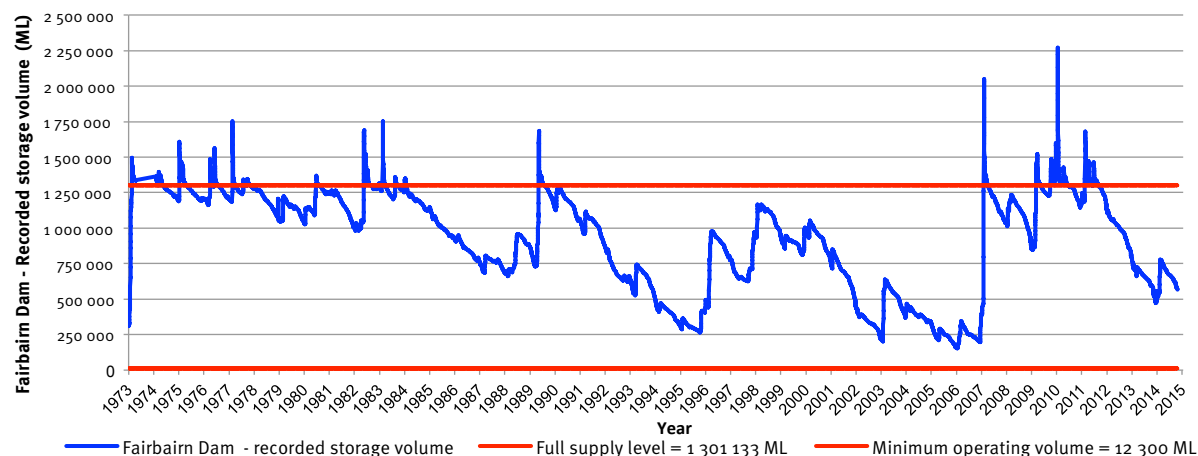


Figure 4: Historical performance of Fairbairn Dam

It should be noted that historical performance is not always a suitable indicator of future performance. In particular, the historical performance of the storage reflects the historical water demands and climatic conditions at the time. Climatic conditions in the historical record may or may not be reflective of climatic conditions in the future, and more severe events than those experienced in the past may occur in the future.

Future water demand

Appropriate and effective water supply planning not only requires a sound understanding of current water use, but also of likely (and possible) changes to future water demand.

The RWSSA assessed Emerald's water supply system and its capacity to support current demands and future growth in the region. In developing an agreed projection of Emerald's future water demand, key assumptions, such as rates of water use and population, are identified and agreed. The projections will remain subject to ongoing monitoring of actual population growth and variations in water use trends (e.g. changes in water-use practices may increase or decrease consumption rates).

Emerald's future water demand

The Queensland Government Statistician's Office (QGSO) prepares population projections across the state based on census data, economic trends and information from local governments. Based on the QGSO data, the population serviced by the Emerald reticulation network is projected to increase from the current figure of approximately 16 000 people to around 25 000 by 2036.

Figure 5 shows Emerald's projected water demand on the Nogoa Mackenzie WSS to 2036, which is projected to increase from around 4800 ML/a in 2014–15 to around 7200 ML/a by 2036. It is based on the QGSO population growth projection and an assumed constant per capita water demand of 800 L/c/d, which is just slightly above the average per capita demand of 785 L/c/d over the last six years. The projection also assumes that commercial and other non-residential uses remain proportional to residential demand.

The projection indicates that, in about 10 years, Emerald's demand is likely to exceed the volume of water council has nominally allocated for the town.

If population growth differs from the growth projection, or if water-use rates are either higher or lower than assumed, the actual water demand will also change.

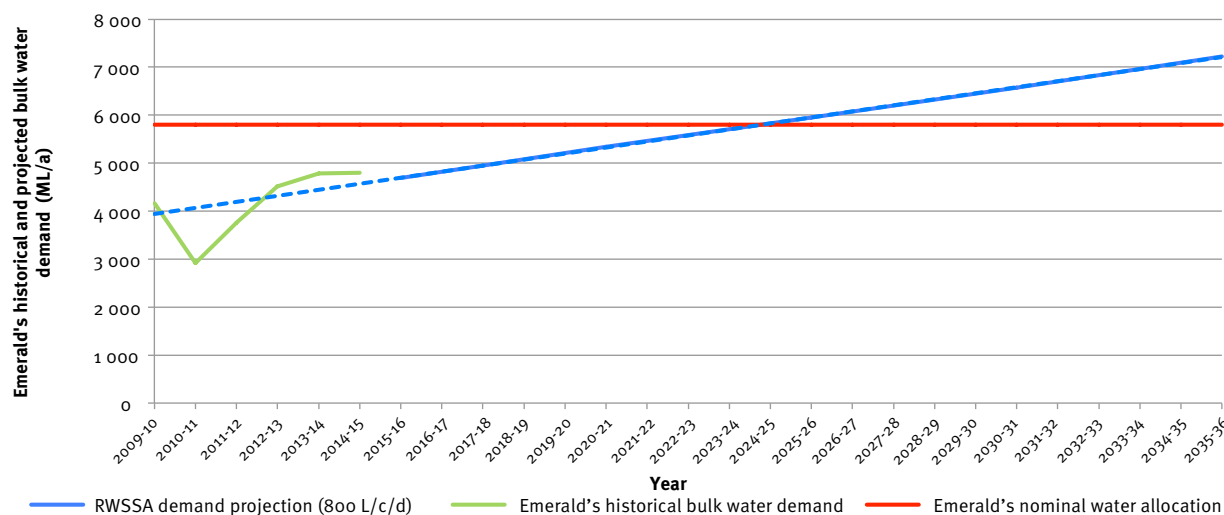


Figure 5: Emerald's historical and projected bulk water demand



Other users' future water demand

Urban use

Like Emerald, other towns that currently access water from the Nogoa Mackenzie WSS are predicted to grow over the next 20 years. Population is a significant driver of urban demand and is expected to contribute to increased water demand. The RWSSA forecasts the total water demand on the Nogoa Mackenzie WSS of communities other than Emerald to grow from around 4000 ML/a in 2014–15 to just over 5200 ML/a in the next 20 years. This increase in demand will not have any significant impact on Emerald's future water security.

Industry

A large portion of the HP allocations in the Nogoa Mackenzie WSS are used to meet coalmining activity and other industrial water demand. Despite proposals for mine expansions and some new projects, a downturn in the industry is recognised. Most global forecasts of the coal price currently predict a flat outlook through the next decade. However, market demand may change. Because all of the water available in the Nogoa Mackenzie WSS is already committed, this may result in pressure to trade some MP allocations currently directed to agricultural use, with a view to their conversion to HP allocations (which are better suited to industry and mining demands).

Agriculture

Agriculture around Emerald is a strong, ongoing driver of the total regional water demand and the sector has undergone development to make best use of available water resources. Over the past eight years, agricultural demand averaged about 80% use of the water allocations held by the sector. It is expected that steady demand for water across the agricultural sector will continue to be met by existing water entitlements.

Water supply system capability

Hydrologic assessments were undertaken to ascertain the capability of Emerald's existing bulk water supply system to meet current and projected future water demands.

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Historical and stochastic modelling techniques were both used to simulate the performance of Emerald's water supply from the Nogoia Mackenzie WSS.

Historical modelling was used to demonstrate how the water supply would have performed under historical climatic conditions for a range of water demands and operating scenarios. As outlined earlier, stochastic modelling accounts for climate variability, assessing potential impacts of events more extreme than those observed historically and allowing estimates of less frequent events by providing a performance estimate of the Nogoia Mackenzie WSS over 10 000 years.

Stochastic modelling involves generating data sequences that incorporate key statistical indicators from the historical record. One hundred replicates of 10 000 years of stochastic rainfall, evaporation and streamflow data were generated for the Nogoia Mackenzie WSS, and hydrologic modelling undertaken for each of the 100 replicates. Median outputs from the stochastic modelling are presented in this assessment. Using the median output means that half of the replicate sequences had a lower frequency and half had a higher frequency of an event occurring.

The hydrologic assessments undertaken assumed that all existing water entitlements in the catchment were fully developed and operational, with the exception of water allocations associated with the Nogoia Mackenzie WSS. In the case of the Nogoia Mackenzie WSS, the assessment considered scenarios that tested current scheme demand (which currently averages about 80% of the full entitlement demand) and full entitlement demand. The hydrologic assessments also examined the effect of council's existing water restriction regime on the performance of its supply. Announced allocations rules were applied to both the MP and HP water allocations in accordance with the Nogoia Mackenzie WSS water-sharing rules, as set out in the *Fitzroy Basin resource operations plan 2014*.





Frequency of water restrictions and supply shortfalls

For this RWSSA, Emerald is considered to have experienced a water supply shortfall when the Nogoa Mackenzie WSS is unable to meet the community's water demand. This could, for example, be as a result of Fairbairn Dam becoming depleted due to severe or ongoing drought. This assessment does not consider potential water supply shortfall resulting from other factors such as a pump, pipeline or treatment plant failure.

Historical assessment

Scenario I simulated full entitlement use with no restrictions. Assuming all of the water allocations in the Nogoa Mackenzie WSS were fully used each year and council did not implement water restrictions, the historical modelling indicates Fairbairn Dam would have reached its minimum operating level on one occasion during the simulated historical period (1901–2007). The assessment indicated that this event would have lasted for about one and a half months.

Scenario II simulated current use across the Nogoa Mackenzie WSS (about 80% of full entitlement) with no council restrictions. Assuming Emerald had an annual water demand of 4560 ML/a (its current annual water demand) and council did not implement water restrictions, the historical modelling indicates the Nogoa Mackenzie WSS could have met demand without Emerald experiencing any periods of water supply shortfall. It is important to note, however, that the modelling also showed that Fairbairn Dam would have fallen to quite low levels on numerous occasions during this period, with only a few months' supply remaining at times.

Scenario III simulated current use across the Nogoa Mackenzie WSS and included council restrictions. It showed similar performance to scenario II—that is, the Nogoa Mackenzie WSS met current demand across all HP users in the Nogoa Mackenzie WSS (including that for Emerald) in each year of the historical simulation. Fairbairn Dam also fell to quite low levels on numerous occasions under this scenario.

Stochastic assessment

As outlined earlier, stochastic modelling accounts for a wider variation of potential climate scenarios than the historical modelling, and allows estimates of supply security to be explored statistically over a longer time frame (in this case, providing a performance estimate of the Nogoa Mackenzie WSS over 10 000 years). In each scenario when Fairbairn Dam reaches minimum operating level (the vertical red line in Figure 6), a supply failure is assumed.

Scenario I (i.e. the blue line in Figure 6) simulated full use of entitlements in the Nogoa Mackenzie WSS with no council restrictions in place. The stochastic modelling indicates that under this scenario, Fairbairn Dam may fall below its minimum operating level about once in 130 years, on average.

Scenario II (the green line in Figure 6) simulated current water demand (average use at about 80% of the Nogoa Mackenzie WSS water allocation) with no council restrictions in place. The stochastic modelling indicates that under this scenario, Fairbairn Dam may fall below its minimum operating level about once in 330 years, on average.

Water restrictions for Emerald

Figure 6 shows the likelihood of Fairbairn Dam falling below identified trigger volumes, which correspond to restriction levels under the council's restriction regime. The vertical bands signify council water restrictions, with the darker blue bands representing more severe restrictions.

Scenario III (the red line) simulated current water demand, but with council water restrictions in place. Council's restrictions are triggered by the volume remaining in Fairbairn Dam. Point A signifies that the level in Fairbairn Dam is expected to be below 105 000 ML about once in 13 years (which is the trigger for commencing Level 4 restrictions). So, Level 4 restrictions would not be expected to occur more than once in 13 years, on average. Similarly, point B signifies that Emerald could experience at least Level 3 restrictions once in 8 years, on average, and point C signifies that Emerald could experience at least Level 1 water restrictions once in 5 years, on average.

In scenario III, Fairbairn Dam reaches minimum operating level about once in 370 years, on average.

The difference in performance between scenario II and scenario III provides an indication of the extent that council's existing restriction regime might prolong supply, mitigating the likelihood of supply failure.

The modelling indicates that council's water restriction regime preserves the supply remaining in Fairbairn Dam for longer than the announced allocations arrangements alone, because council's restrictions come into effect earlier and escalate more quickly than the announced allocations arrangements. However, the water saved by the council restrictions is shared among other users of the Nogoa Mackenzie WSS.

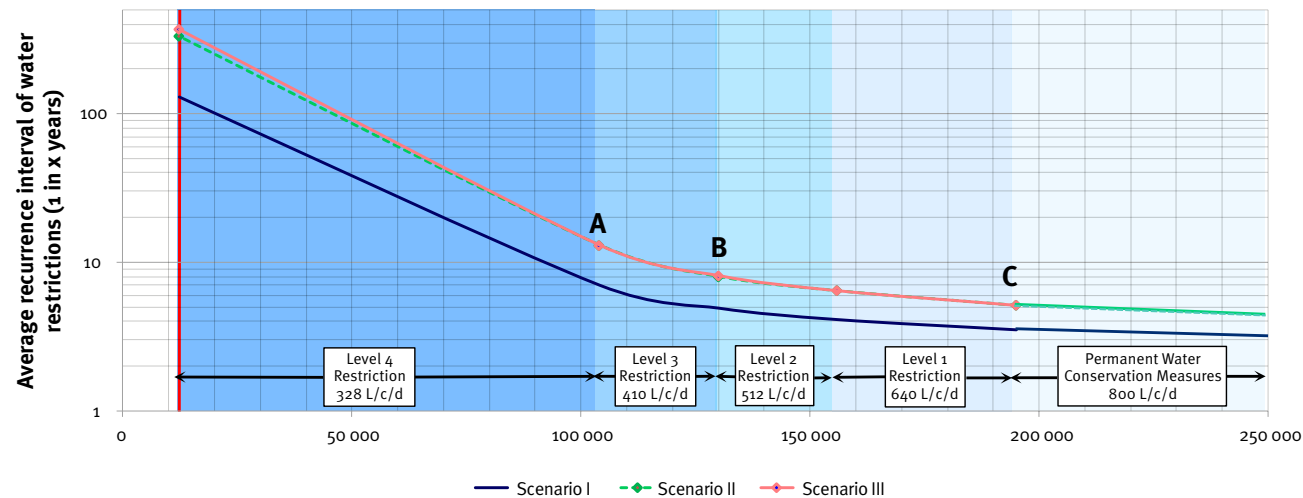


Figure 6: Likelihood of supply levels, supply shortfall and water restrictions for Emerald



Duration and severity of water restrictions

Figure 7 shows, for scenario III, the frequency and duration of water restriction events lasting longer than 3 months, 6 months and 12 months, respectively. On average, Emerald could potentially experience restrictions for periods longer than 3 months about once in 13 years (790 times in 10 000 years), and restriction periods lasting longer than 12 months about once in 27 years (370 times in 10 000 years). Figure 7 also indicates the likelihood of Emerald experiencing Level 2 restrictions or worse, Level 3 restrictions or worse and Level 4 restrictions for these durations.

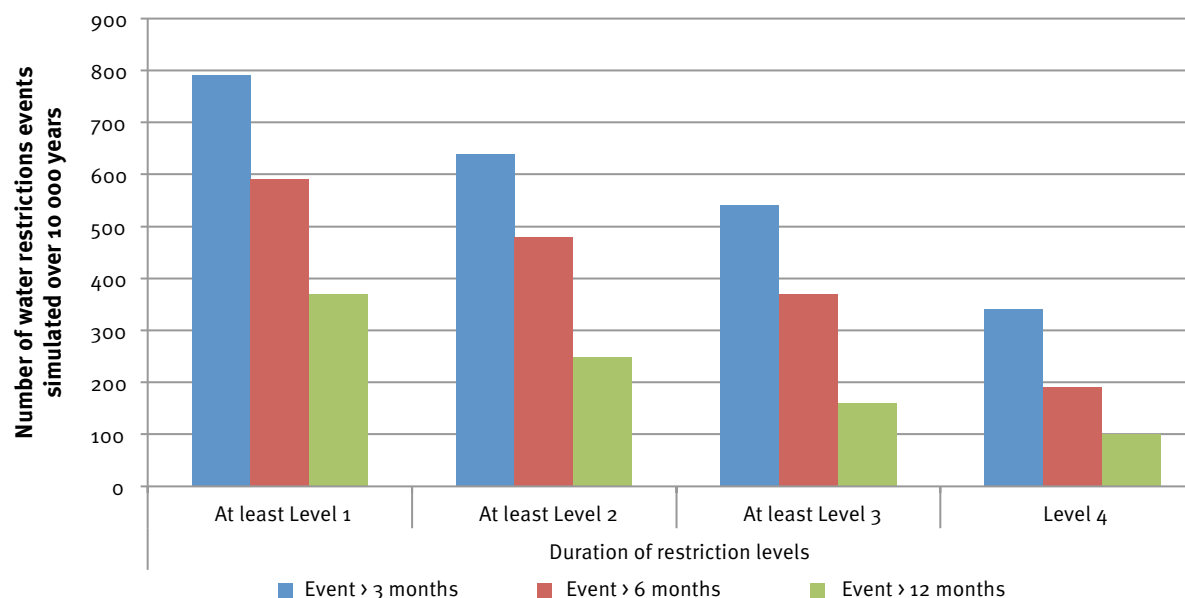


Figure 7: Number and duration of water restrictions at current demand

With increasing water demand, potential increases in the likely frequency and duration of these water restrictions is expected.

Considerations such as frequency, duration and severity of restrictions imposed to prolong supply in times of water shortage are critical and fundamental components of the water supply planning undertaken by councils across Queensland.

Although the frequency of water restrictions is an important consideration, the duration and severity of each restriction period may be more important for many water users. For example, it may be more acceptable to experience less severe and shorter periods of water restrictions more frequently than to experience more severe and longer periods of water restrictions less frequently.

Together, the frequency, severity and duration of water restrictions, along with the ability to maintain a minimum supply during drought, are fundamental parts of water supply planning and are referred to as 'level of service'. The level of service for Emerald is a matter for council to determine, in discussion with the community.

Water supply system capability outcomes

The RWSSA confirmed that Emerald's demand is likely to exceed the volume council has allocated for the town in about 10 years—at which point council will require additional water supplies to meet Emerald's water demand (see Figure 5). As noted, variation in population growth, per capita water demand and other factors will influence the timing of this shortfall.

Fairbairn Dam is the second largest storage in Queensland, capable of holding several years' supply, and is the main storage supplying the Nogoa Mackenzie WSS.

Urban demand represents less than 4% of total demand on the Nogoa Mackenzie WSS. As a result, the performance of Emerald's water supply is largely dependent on the demands placed on the scheme by users of the MP water allocations, and by the other users of HP water allocations.

The Nogoa Mackenzie WSS is fully developed, with all water allocations associated with the scheme currently committed. Actual annual use currently averages about 80% of the total allocation volume. The RWSSA shows that, at this level of use, Fairbairn Dam might reach its minimum operating level about once in 370 years on average, compared to about once in 130 years under full use of the existing allocations. It is apparent that current levels of use have helped shore Emerald's water security.

Council has maintained Emerald's current water restriction regime for some time. Modelling shows that at current demand on the scheme, Level 2 or more severe water restrictions are expected about once in every 6.4 years.

Balancing the cost of greater water security (such as through the purchase of additional water allocations) against other factors (such as the frequency, severity and duration of water restrictions) is part of the level of service that council establishes with its water customers, and is a matter for council to determine. The RWSSA provides information that council can use in conjunction with other important factors (such as water availability, customer needs, liveability and affordability) in consideration of the appropriate level of service objectives.





Moving forward

Emerald's RWSSA represents a shared understanding between Central Highlands Regional Council and the Queensland Government about the region's water supply reliability now and into the future.

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Water supply in the Emerald region is important for the urban, agricultural and industrial users in the area. The predominant uses for water from the Nogoa Mackenzie WSS are agriculture and industry. But with water for town supply from the Fairbairn Dam given the highest allocation priority, the township of Emerald has a resilient water source. Nevertheless, forecasting shows that water demand in Emerald is likely to reach or exceed the council's current water allocations in approximately 10 years. Strategic planning is required to determine a long-term, sustainable per capita consumption level, and effective management and community engagement are needed to reduce the demand to that level.

Opportunities to increase the future water security of the town of Emerald will need to be achieved through a variety of actions. These include:

- council planning and budgeting to determine the best opportunities to purchase water for future growth if and when HP water allocations become available on the market
- maintaining and improving water efficiency for residential gardens and industry—current key performance indicator data shows that the Central Highlands Regional Council area, including Emerald, has high water use compared to state and national rates
- continuing and improving work to monitor, detect and reduce water losses within the town's supply network
- reviewing the balance of demand management between community needs and infrastructure investment (e.g. the rollout of smart meters)
- ensuring both water treatment plants in Emerald have the infrastructure needed to maximise internal water re-use and supply the whole network if and when required
- continuing to replace the use of potable or raw water with the use of recycled water where this is a feasible and appropriate use.

By continuing to focus on water security through these actions, the future potential growth and development in key areas can be planned for and sustained in the Emerald area, allowing water security to be a key factor in unlocking future growth and prosperity for this part of Central Queensland.



**For more information on the
Regional Water Supply Security Assessment program
please visit www.dews.qld.gov.au**