



Mackay

regional water supply security assessment

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Introduction

The city of Mackay is situated between the Great Dividing Range and the Great Barrier Reef, approximately halfway between Rockhampton and Townsville. Mackay is a key centre for the mining industry, supports some of the state's most important sugarcane producing areas and is a popular destination for tourists.

Mackay Regional Council is the registered water service provider for Mackay's urban water supply system, providing both water and wastewater services to Mackay's urban areas. The broader Mackay region ranges from Midge Point and Bloomsbury in the north to Eungella in the west and Cape Palmerston and Koumala in the south. The scope of this assessment, however, is limited to the communities receiving water from Dumbleton Rocks Weir. The weir is part of the Pioneer River Water Supply Scheme (Pioneer River WSS) and supplies town water through Mackay's reticulation network. Mackay's reticulation network services an area that extends from Seaforth in the north to McEwens Beach in the south, and Walkerston in the west to Slade Point to the east, including Mackay city (Figure 1 overleaf). The area of Sarina was also included in the scope of this assessment because potable water from Mackay's reticulation network supplements the Sarina network.

Safe, secure and reliable water supplies are an essential resource for Mackay, not only for the health and wellbeing of the community, but also for supporting the region's economic growth and development. A significant agricultural sector surrounding Mackay also relies heavily on the availability of water for irrigation and other purposes.

The Department of Energy and Water Supply and the Mackay Regional Council have partnered to investigate and establish a shared understanding of the existing security of Mackay's urban water supply system and its capacity to support future growth. Arising from the partnership, this regional water supply security assessment (RWSSA) provides valuable information about Mackay's urban water supply security and a foundation for future water supply planning.

In order to identify the timing and magnitude of potential risks for water supplies from the Pioneer River WSS, this RWSSA has considered a number of water demand levels to reflect the potential impact of population growth and increased water use. Access to additional water sources, such as groundwater and Sarina's local supply, would improve water supply security.

It is important to note that the scope of this assessment does not address water quality issues that may affect water supplies. Also, the information presented does not consider any changes to the capacity of the existing water supply system and associated infrastructure, nor does it specifically consider the impact that climate change may have on the catchment hydrology. Changes to demand (which may be driven by climate variability, population growth or other factors) have been considered in this assessment by taking into account a wide range of water demand levels, for both medium and high priority water users.

Water supply sources

Water for the Mackay reticulation network is supplied from the Pioneer River WSS at Dumbleton Rocks Weir (on the Pioneer River) and from eight local groundwater bores. Dumbleton Rocks Weir is largely supported by releases from Teemburra Dam (also on the Pioneer River).

Pioneer River Water Supply Scheme

Dumbleton Rocks Weir and Teemburra Dam are part of the Pioneer River WSS, which is owned and operated by SunWater in accordance with the Water Plan (Pioneer Valley) 2002 and related regulatory documents. SunWater provides water storage and transmission services for water allocation and entitlement holders.

The Pioneer River WSS has:

- 30 753 megalitres per annum (ML/a) of high-class A allocations, comprising
 - » 16 000 ML/a allocated to the council used to supply the Mackay reticulation network
 - » 12 735 ML/a of uncommitted water held by SunWater and currently unused
 - » 2018 ML/a mostly allocated to commercial users with high water reliability needs
- 47 357 ML/a of high-class B allocations that are mostly used to supply agricultural and irrigation demands.

Water supply in the Pioneer River WSS is supported by releasing water stored in Teemburra Dam. Water can be released via two routes. One option is to release water from the dam via a pipeline into Palm Tree Creek, flowing

downstream into Cattle Creek, the Pioneer River, Mirani Weir, Marian Weir and finally Dumbleton Rocks Weir. This route reduces losses of water due to seepage and evaporation, but bypasses water users located upstream of Mirani Weir on the Pioneer River. The other option is to release water directly from the dam into Teemburra Creek to the Pioneer River, which provides water to the users located upstream of Mirani Weir.

Dumbleton Rocks Weir is located approximately 12 km upstream of Mackay on the Pioneer River. The council sources water for the Mackay reticulation network from Dumbleton Rocks Weir under its high-class A water allocation. The water is treated at Nebo Road Water Treatment Plant and supplied into the reticulation network. Within the network there are 29 reservoirs for potable water storage and 28 pump stations to maintain continuity of supply and water pressure.

Groundwater

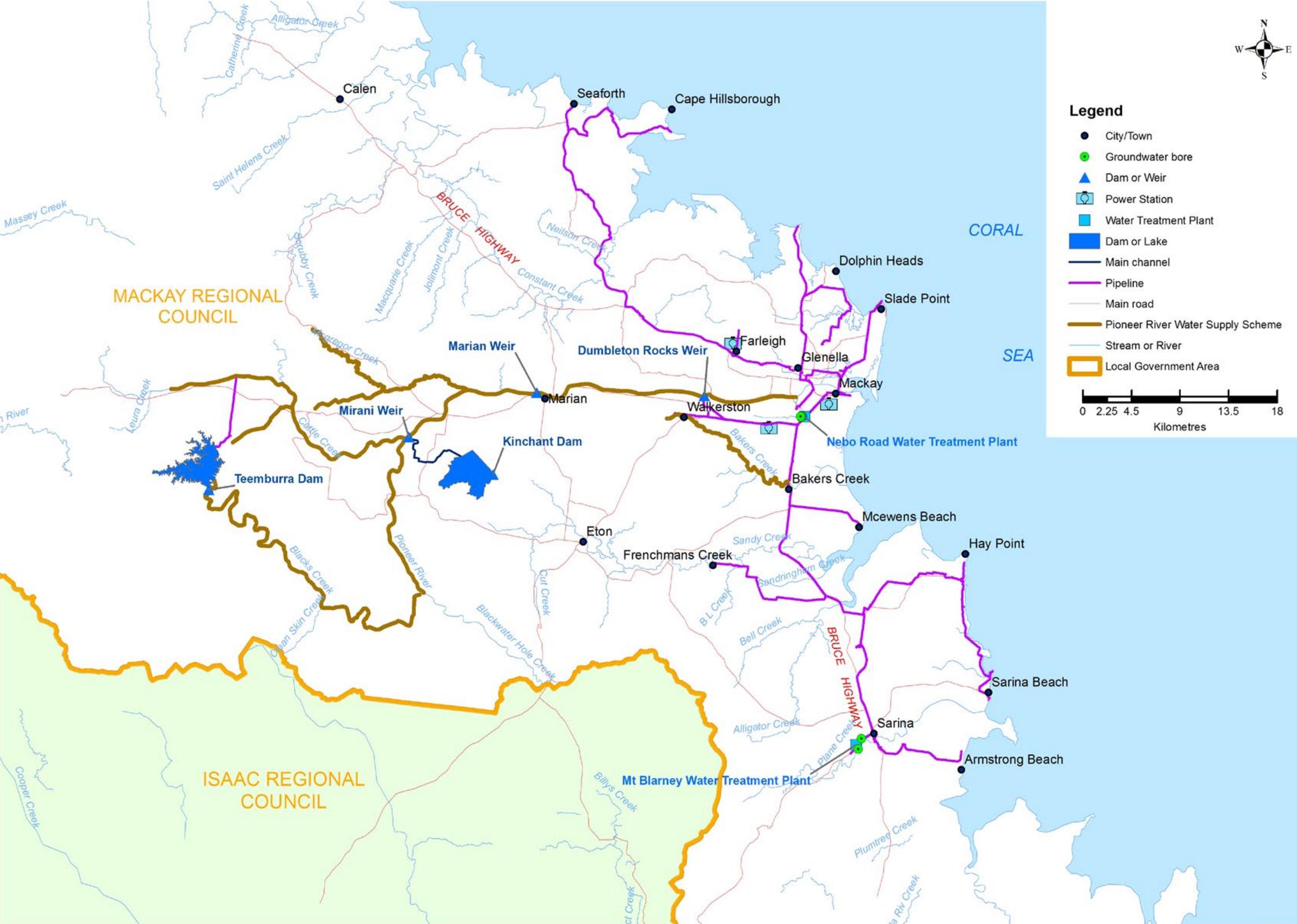
The council holds 1300 ML/a of groundwater allocations to extract water from eight bores near the Nebo Road Water Treatment Plant (Nebo Road bores). The bores are part of the Pioneer River alluvium subartesian system. Groundwater is treated at the Nebo Road Water Treatment Plant and supplied into the Mackay reticulation network

when required. Monthly total volumes of extracted groundwater from 2011 to 2015 indicate that groundwater usage is sporadic (only 3 out of 5 years), ranging from less than 1 ML (2014) to 41 ML (2011). The council primarily meets the community's water demand from Dumbleton Rocks Weir, with groundwater being used as a contingency measure when either raw water quality or supply affects the Pioneer River source water. Accordingly, analysis of the water supply security for this assessment does not include consideration of any groundwater take. However, as noted above, access to additional water sources such as groundwater would improve water supply security.

Recycled water

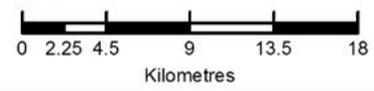
The council operates three recycled water schemes, with the largest being the Mackay South scheme at Bakers Creek and two smaller schemes at the Sarina and Mirani townships. Mackay South allocates water to sugarcane growers, while the Mirani and Sarina schemes also include golf courses. This recycled water is a reliable supply provided in addition to reticulated water. In the unlikely event that this recycled water supply becomes unavailable in the future, some of this demand may switch to the Mackay reticulation network or raw water supply within the Pioneer River WSS.

Figure 1: Assessment region and Mackay's water supply system



Legend

- City/Town
- Groundwater bore
- ▲ Dam or Weir
- ⊞ Power Station
- ⊞ Water Treatment Plant
- Dam or Lake
- Main channel
- Pipeline
- Main road
- Pioneer River Water Supply Scheme
- Stream or River
- ▭ Local Government Area





Water users and water use

It is estimated that the Mackay region had a population of approximately 128 000 in 2015 and approximately 87% of the population within this region were connected to Mackay's reticulation network. This network supplies water to residential, commercial, municipal and industrial users, as well as to the Sarina reticulation network.

Mackay's reticulation network

To investigate the council's supply performance from the Pioneer WSS, the population serviced by the Mackay reticulation network was assumed to be the combined population serviced by the Mackay and Sarina reticulation networks.

The council describes water users in terms of equivalent persons (EP), which is based on the number and type of customer water connections across the reticulation network. This results in a larger population measure than the residential population serviced by the network, as it assigns an 'equivalent population' to non-residential water users such as commercial premises, industrial water users and public connections for parks, libraries and residential dwellings. Using this measure can provide a comprehensive understanding of water use by different water users across the reticulation network. The council estimated that they provided water supply services to a total of 128 700 EP in 2015, which included residential and non-residential components for the Mackay and Sarina communities. The council predicts that they will provide water supply services to 173 300 EP in 2036.

The annual volume of water sourced from Dumbleton Rocks Weir for use across the Mackay reticulation network from 2000–01 to 2015–16 averaged 12 377 ML (Figure 2). Water use has remained relatively steady over this time, despite significant population growth, due to successful demand management initiatives.

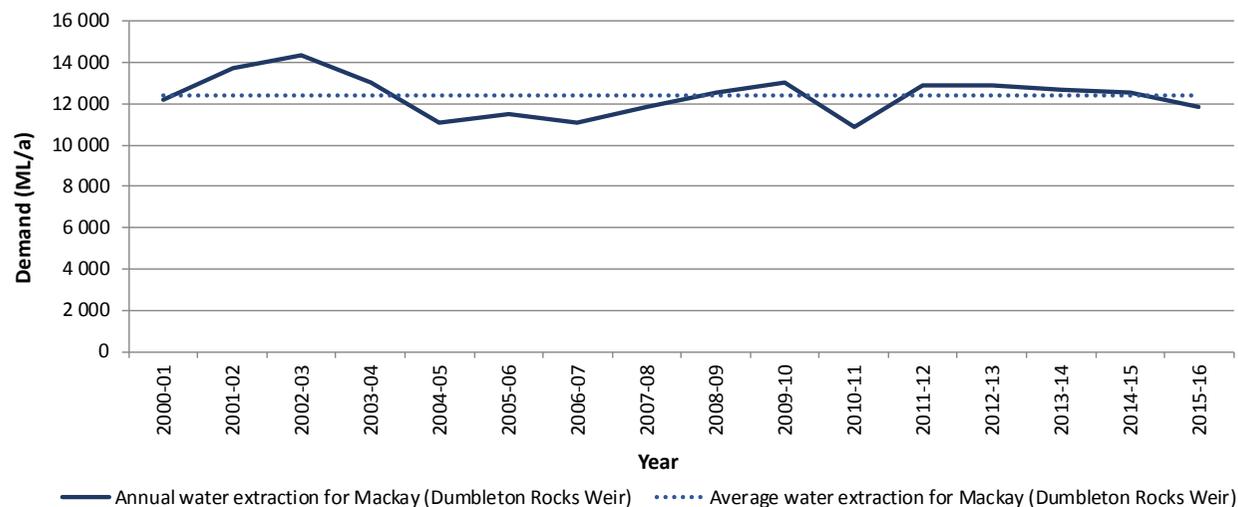
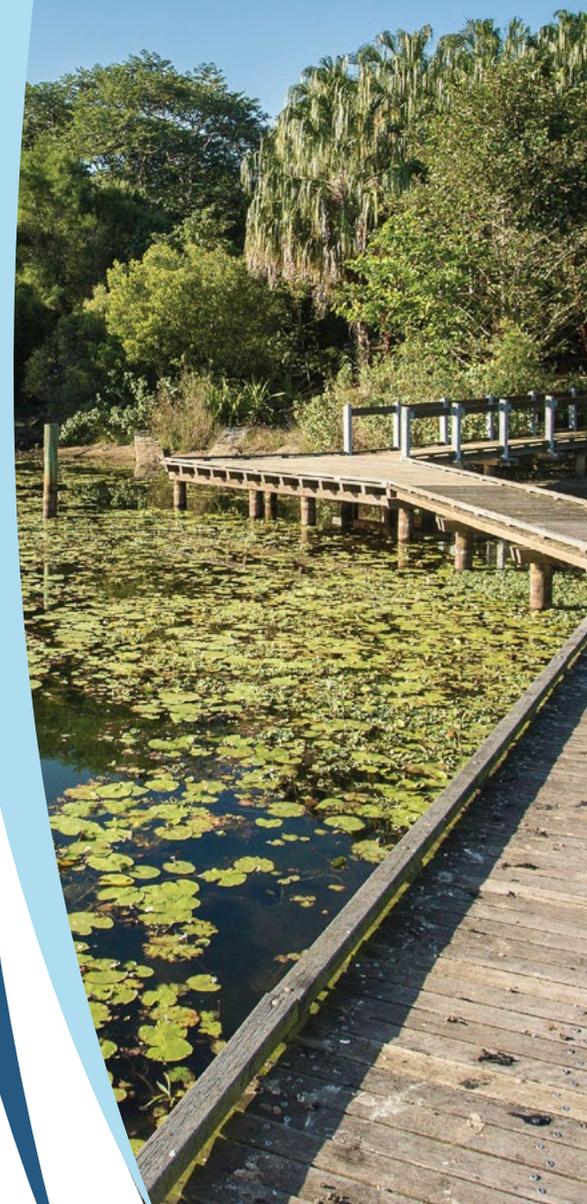


Figure 2: Annual Dumbleton Rocks Weir water extraction, 2000-01 to 2015-16

Water use varies between years and within each year depending on various factors (including climatic conditions such as rainfall), with higher use usually occurring during drier and hotter periods. The Mackay region has a subtropical climate. Generally, the wet season runs from November through to March, with peak rainfall occurring from January to March. The average annual rainfall in Mackay is approximately 1600 mm, based on data recorded from 1959-60 to 2015-16 at the Mackay M.o station (Table 1).

Table 1: Lowest, median, highest and average annual rainfall for Mackay

| Rainfall station | Annual rainfall (mm) | | | |
|--|----------------------|--------|---------|---------|
| | Lowest | Median | Highest | Average |
| Dumbleton Rocks Alert (station no: 033300), 1995-96 to 2015-16 | 600 | 1360 | 3572 | 1528 |
| Mackay M.o (station no: 033119), 1959-60 to 2015-16 | 795 | 1585 | 2944 | 1624 |



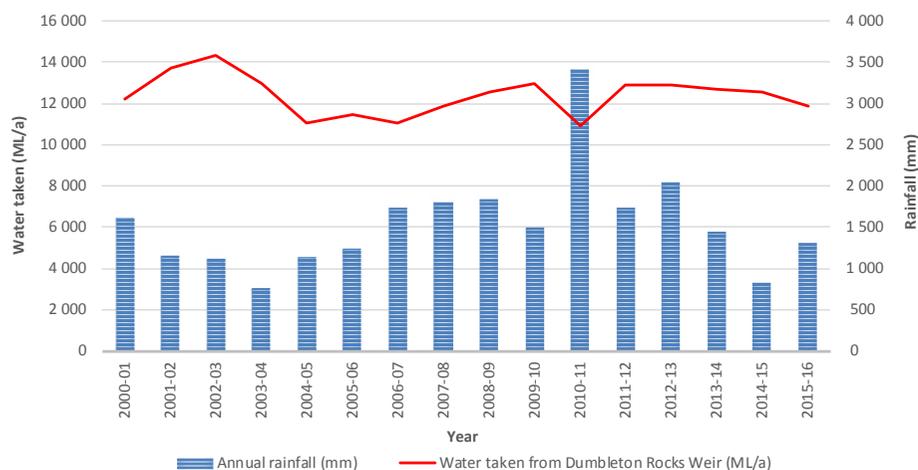


Figure 3: Total annual rainfall and total water taken from Dumbleton Rocks Weir

Figure 3 shows the relationship between the annual rainfall recorded in Mackay (Mackay M.o station) and the annual volumes of water taken from Dumbleton Rocks Weir for the period 2000–01 to 2015–16. As can be expected, Mackay’s annual water use tends to rise during the dry years and decrease during the wet years.

Water restrictions and demand management measures

The council can implement water restrictions for the Mackay communities to manage water demand during peak demand periods, if needed. The intent of implementing Mackay’s water restrictions is to reduce the peaks of water consumption in order to accommodate peak demands within existing infrastructure. The council’s current policy on the application of water restrictions focuses on reducing demand to address water infrastructure constraints, rather than supply issues in relation to low water availability. Hence, this assessment has not considered the implications of a future water restrictions policy on water supply security.

The council is also actively seeking to generate awareness within communities about their water supply capacity, and is particularly encouraging households to monitor water flow to reduce their water use—which may ultimately delay the need to build new infrastructure.

Some of the demand management measures promoted by the council include:

- water education programs (e.g. the H₂O Education Program teaches school students the importance of water)
- tips to save water (available on the council’s website)
- initiatives that enable households to monitor and manage their water usage (e.g. the ‘myh₂o’ initiative)
- water restrictions when required (mainly for outdoor water use).

Other users of bulk water supply sources

The city of Mackay is located within the Pioneer Valley and supports an extensive agricultural sector, including sugar cane, cattle, forestry and irrigated cropping. Demand for water in the Pioneer Valley is primarily met through the Pioneer River WSS, which provides water for irrigation, industry and the Mackay reticulation network. Groundwater is also a water supply source for some domestic and irrigation use, principally for the production of sugar cane.

Marian and Mirani urban centres

From June 2015, water to supply the Marian and Mirani urban centres has been extracted from the Pioneer River and treated at the Marian Water Treatment Plant. Prior to this date, Marian and Mirani had been sourcing water from groundwater bores located in aquifers that are highly utilised, inconsistent in water quality and, in some cases, unable to meet demand. The new water treatment plant services Marian and Mirani, which had undergone significant population growth up to 2013 as a result of resource sector activity.

The council holds a water allocation for 460 ML/a and a water allocation for 60 ML/a to take water from the Pioneer River and supply water users in Mirani/Marian and Gargett/Pinnacle, respectively. Any water from the 60 ML/a water allocation that is not used by the Gargett/Pinnacle water users can be transferred to Mirani/Marian water users. These entitlements are not part of the 16 000 ML/a water allocation that the council holds to take water from Dumbleton Rocks Weir, which is distributed to water users through the Mackay reticulation network.

Agriculture

Agriculture is an integral part of the economy of the Mackay region. The Pioneer River WSS has 47 357 ML/a of high-class B water allocations, mainly used for agriculture. Over the past 15 years (1999–00 to 2013–14), the average annual water use for agriculture has been around one-third of the total high-class B water allocations for the Pioneer River WSS.

The Pioneer River WSS supplies this high-class B water to irrigators through the Pioneer Valley Water Board's distribution network and through direct extraction from Cattle Creek and the Pioneer River. Water allocations managed by the Pioneer Valley Water Board are used almost exclusively for the production of sugar cane.

Many irrigators also source groundwater from aquifers, which underlie much of the area, as well as unsupplemented surface water (i.e. water that is not managed under the Pioneer River WSS).

Industry and mining

Mackay Sugar is one of Australia's largest agricultural cooperatives, producing more than 20% of Australia's raw sugar. The sugarcane industry in the Mackay region has a significant investment in infrastructure, including four operational sugar mills and the largest bulk sugar terminal in the world.

The Mackay region is also the gateway to the rich coal deposits in the Bowen and Galilee basins, becoming the location of choice for many mining service companies providing engineering services—including machinery repair, maintenance and fabrication of metal products for the mining and agribusiness sectors.

Mackay Sugar and other large industries (e.g. BM Alliance Coal Operations and Dalrymple Bay Coal Terminal) hold their own high-class A water allocations within the Pioneer River WSS (totalling 1920 ML/a); therefore, their water use may have an impact on water security for Mackay. Many of the smaller industrial water users (e.g. the Borthwicks Abattoir located near Bakers Creek) are supplied through the Mackay reticulation network (and take water under the council water allocation). As such, this industrial water use is accounted for within the urban water taken to supply the reticulation network (i.e. non-residential component).



Future water use

Effective and appropriate water supply planning requires a sound understanding of not only current water use, but also the possible changes to water demand in the future. This assessment included consideration of future water use across the Mackay reticulation network and other users of water from the Pioneer River WSS.



Image courtesy of Tourism and Events Queensland

A forecast of Mackay’s future urban water demand was collaboratively developed by the Department of Energy and Water Supply and the council. It was based on existing water sources, water-use rates and population projections. The population projections were developed by the council as part of their Mackay Growth Allocation Model.¹ These water demand projections will, of course, remain subject to ongoing monitoring of actual population growth and variations in water-use trends (e.g. education and provision of more timely personal water-use data may reduce water use).

When developing an agreed projection of future water demand on the Mackay reticulation network, it is essential that all key assumptions (such as rates of water use and population growth) are identified and agreed upon. The projections will remain subject to ongoing monitoring of actual population growth and variations in water use trends.

Mackay’s reticulation network

The council uses the Mackay Growth Allocation Model to better understand water demand projections across their network. The model uses a measure of equivalent persons (EP) as the basis for outlining current water use and future water demands. Using this measure, the 2015 residential component of Mackay and Sarina was estimated at 93 600 EP and the non-residential component was estimated to be 35 100 EP—totalling 128 700 EP.

The council has adopted a 1.57% annual population growth rate from 2014 to 2036, which is comparable to the most recently published Queensland Government Statisticians Office population growth rate for Mackay. The council estimated that Mackay and Sarina will reach 173 300 EP by 2036 (Figure 4).

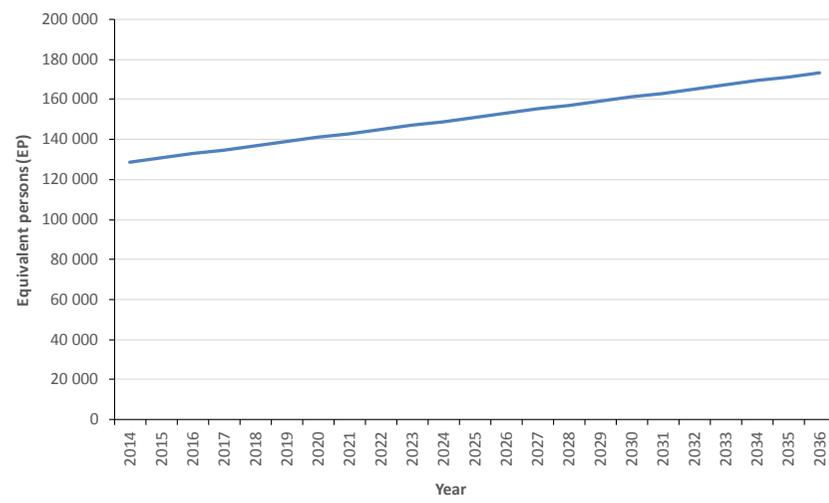


Figure 4: Mackay and Sarina projected population growth (equivalent persons)

1. In the Mackay Growth Allocation Model, the council measures infrastructure planning demands in terms of ‘equivalent persons’ or ‘EP’ rather than per capita. The measure involves quite different planning and assessment methods to the RWSSA, assigning demand associated with parks, commercial premises etc. and an EP value. Therefore, the EP is not a direct measure of actual population (as it results in a larger population measure).

The council estimated that current average water use per equivalent person per day is 280 L/EP/d (assumed to remain unchanged over the period of the assessment). This rate of water use has been applied to the above population projection to estimate future water demand for the Mackay reticulation network. Figure 5 shows the projected water demand for the Mackay reticulation network compared to historical water volumes taken from Dumbleton Rocks Weir. Based on this projected water demand, and assuming that Sarina was solely supplied from Mackay's reticulation network, the council's current water allocation (16 000 ML/a) could be fully utilised by 2028.

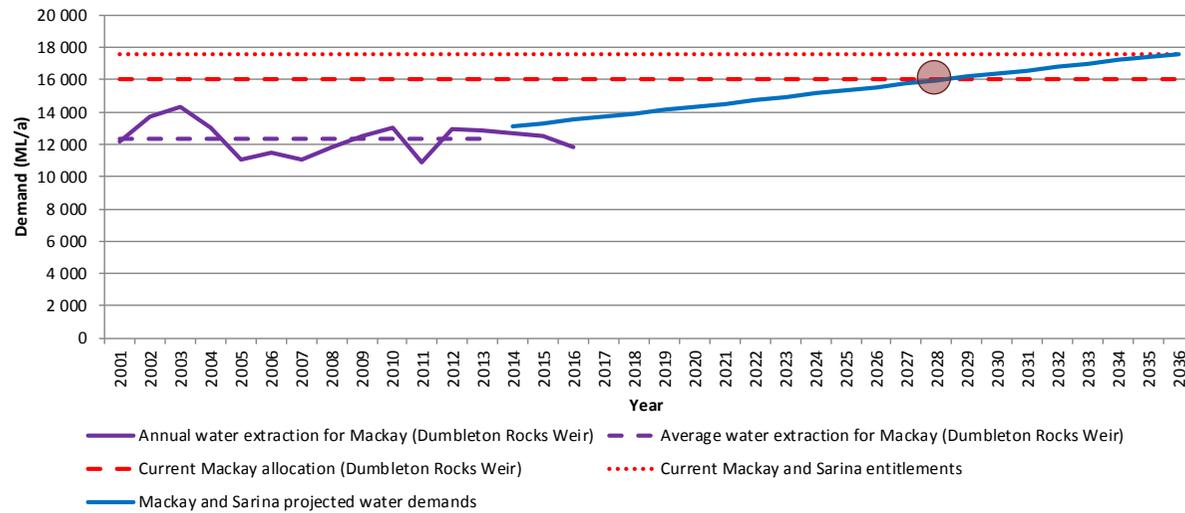


Figure 5: Projected average urban water demand for Mackay's reticulation network

SunWater holds 12 735 ML/a of high-class A water allocation, which is currently uncommitted. Future use of this uncommitted water would increase the total volume of water being extracted from the Pioneer River WSS, thereby placing additional pressure on the system's performance and reliability. Some, or all, of this water allocation could be purchased by the council to meet future demands. The use of part, or all, of this water allocation has been considered when evaluating the council's water supply performance from the Pioneer River WSS and is discussed in more detail in 'Water supply system capability'.

The use of groundwater by the council is expected to continue as a contingency measure in the future. The contribution from the Nebo Road bores is not envisaged to significantly improve the long-term performance of bulk water supply, but it may help alleviate short-term pressures due to water quality issues in the Pioneer River.





Other users of the bulk water supply sources

Marian and Mirani urban centres

Future growth in water demand for the Marian and Mirani urban centres is anticipated to be met from within their existing entitlements from the Pioneer River WSS and should not significantly impact on Mackay's future water supply security.

Agriculture

Agricultural water demand from the Pioneer River WSS appears unlikely to change significantly in the near future, although some growth in agricultural activities may occur. For example, some farmers in the Mackay region have recently been trialling the cycling of rice crops in addition to sugar cane. While the extent of rice cropping now and in the future is currently unclear, there is the potential that farming rice crops in between traditional sugarcane planting and harvesting schedules may result in increased water demand from the agricultural sector.

Water demand from any such growth is likely to be met through increased use of existing high-class B water allocations within the Pioneer River WSS and entitlements in the groundwater management area.

Industry and mining

It is not anticipated that there will be any significant developments or change in the industry sector that will impact significantly on Mackay's water demand. However, there is always potential for future increases in mining activity, which may result in an increase in the Mackay population. For example, new mining activity in the Bowen Basin may generate boom periods in the mining industry, which could attract workers to the Mackay region. It is anticipated that any resulting growth in water demand would therefore be approximately reflected through increased urban demand linked to population growth, which is already factored into the demand projections presented above.

Water supply system capability

Hydrological modelling was undertaken to determine the potential water supply security impacts for Mackay resulting from the use of some, or all, of SunWater’s uncommitted water allocation—as well as the potential benefit of the current low levels of utilisation of agricultural water allocations.

Hydrologic assessment of the Pioneer River Water Supply Scheme

Both historical and stochastic modelling techniques were used to simulate the council’s water supply performance from the Pioneer River WSS. While the historical performance of a water supply system offers an indication of supply security, its application to future performance is limited. Historical modelling was used to determine how the Pioneer River WSS would have performed under historical climatic conditions for a range of demand levels and operating arrangements. The historical performance does not take into account trends in demand patterns, climate variability or variation in historical inflows. The stochastic modelling undertaken involved generating 100 replicates of 10 000 years of stochastic data—it incorporates key statistical indicators from the historical record and accounts for a wider variation of potential climatic scenarios than the historical record.

In the hydrological modelling, full use of the council water allocation from Dumbleton Rocks Weir (i.e. 16 000 ML/a) was assumed because of the potential for council water use to approach the full entitlement volume, particularly in the situation where consecutive dry seasons may be experienced. The modelling also assumed full use of all other high-class A water allocations (i.e. industry, other urban, SunWater and Pioneer Valley Water Board), except SunWater’s uncommitted water allocation. A number of total high priority demand levels based on increasing use of SunWater’s uncommitted water allocation were used in the modelling to reflect the possible impact of increasing demand from population growth or other causes. Most of the modelling scenarios assumed full use of high-class B water allocations for agriculture. Table 2 outlines the demand scenarios that were assessed.

Table 2: Pioneer River WSS demands modelled

| Scenario | High-class A water allocation demand | | | | High-class B (agricultural) water allocation demand |
|--|--------------------------------------|------------------------------|-------------------|--------|---|
| | Council | SunWater’s uncommitted water | Other water users | Total | |
| Low agricultural water use | 16 000 [#] | 0 | 2018 [#] | 18 018 | 15 000 [*] |
| Full agricultural water use | 16 000 [#] | 0 | 2018 [#] | 18 018 | 47 357 [#] |
| One-third use of SunWater’s uncommitted water | 16 000 [#] | 4 245 | 2018 [#] | 22 263 | 47 357 [#] |
| Two-thirds use of SunWater’s uncommitted water | 16 000 [#] | 8 490 | 2018 [#] | 26 508 | 47 357 [#] |
| Full use of water allocations (including SunWater’s uncommitted water) | 16 000 [#] | 12 735 [#] | 2018 [#] | 30 753 | 47 357 [#] |

* The low agricultural water use scenario adopts the average water use for agriculture from 1999–00 to 2013–14.

[#] Full use of relevant type of water allocations.



Likelihood of water restrictions and water supply shortfalls

Figure 6 provides an indication of the estimated frequency of reaching specified water volumes in Dumbleton Rocks Weir and Teemburra Dam under a range of high-class A demand levels. Volumes in Dumbleton Rocks Weir included the minimum operating volume, which is the volume in the weir below which water cannot be released to meet daily demand (i.e. 20% full supply volume), therefore representing a water supply shortfall² and the nominal operating volume, which is the volume in the weir that requires releases from upstream dams (i.e. 60% full supply volume). Statistics for reaching 25 000 ML in Teemburra Dam (i.e. approximately 20% full supply volume) were assessed, as this volume represents approximately 12–18 months of supply for the Mackay reticulation network assuming no inflows to the dam, full use of the council's water allocation (i.e. 16 000 ML/a) and no other water use. Stochastic modelling results indicate that the use of the uncommitted water and the levels of water use for agriculture can significantly affect the council's water supply performance from the Pioneer River WSS.³

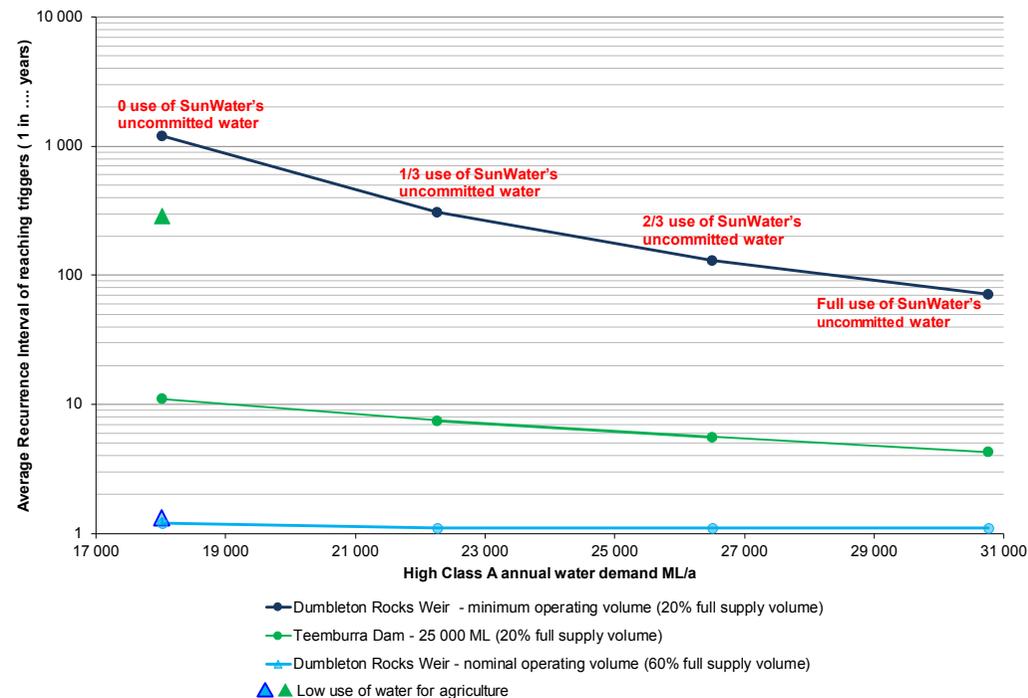


Figure 6: Frequency of Dumbleton Rocks Weir and Teemburra Dam reaching specified water volumes under a range of high priority demand levels⁴

- A water supply shortfall is defined as an event when water supply is unable to meet daily urban water demand. Therefore, if water demand is 10 ML for a particular day and the system is only able to supply 8 ML due to limited availability or operational constraints, this would be defined as a supply shortfall.
- The stochastic modelling results were aggregated and the median output used to identify the likelihood of low water levels and water supply shortfalls. The median represents the 'centre' of the data, as half of the sequences had a lower likelihood and half had a higher likelihood of an event occurring.
- There are no instances of Dumbleton Rocks Weir reaching minimum operating volume in the stochastic modelling simulation period with low agricultural water use and SunWater's uncommitted water entirely unused.

Stochastic modelling results indicate that the frequency of Dumbleton Rocks Weir reaching minimum operating volume is nearly four times higher when one-third of SunWater’s uncommitted water is used compared to when SunWater’s uncommitted water is entirely unused. The full use of SunWater’s uncommitted water results in the minimum operating volume being reached nearly once every 70 years, which is about 17 times greater than when this uncommitted water is entirely unused. Therefore, the use of SunWater’s uncommitted water may pose increased pressure on urban water security for Mackay and Sarina, and the council will continue to evaluate the timing of increasing its water allocation.

Stochastic modelling results show that with low agricultural water use, Teemurra Dam reaches 25 000 ML 25 fewer times compared to when there is full use of agricultural water allocations. Figure 6 also illustrates that Dumbleton Rocks Weir does not reach minimum operating volume in the stochastic modelling simulation with low agricultural water use. This demonstrates that low use of water for agriculture significantly improves the council’s water supply performance from the Pioneer River WSS.

Along with frequency, the duration of a supply shortfall (i.e. Dumbleton Rocks Weir failing to meet daily demand due to falling below the minimum operating volume) is a key consideration and indicator of the reliability of the water supply system. As water demand increases, so does both the predicted number of occurrences of supply shortfalls and the relative proportion of occurrences that last for less than 2 months, longer than 2 months and longer than 6 months. Figure 7 shows the predicted frequency of supply shortfall occurrences under a range of urban water demand levels for less than 2 months, longer than 2 months and longer than 6 months. Stochastic modelling results suggest that there are no instances of supply shortfall longer than 6 months when uncommitted water is unused. The predicted frequency of supply

shortfall occurrences longer than 6 months increases by more than four times when all of the uncommitted water is used compared to only one-third used. This again demonstrates that the use of some, or all, of SunWater’s uncommitted water may impact on urban water supply security for Mackay and Sarina.

Similar to the previous stochastic results, the lower use of water for agriculture improves the council’s water supply performance from the Pioneer River WSS. Compared to low agricultural water use, the predicted frequency of supply shortfall for longer than 2 months is about five times higher when the full use of agricultural water is assumed.

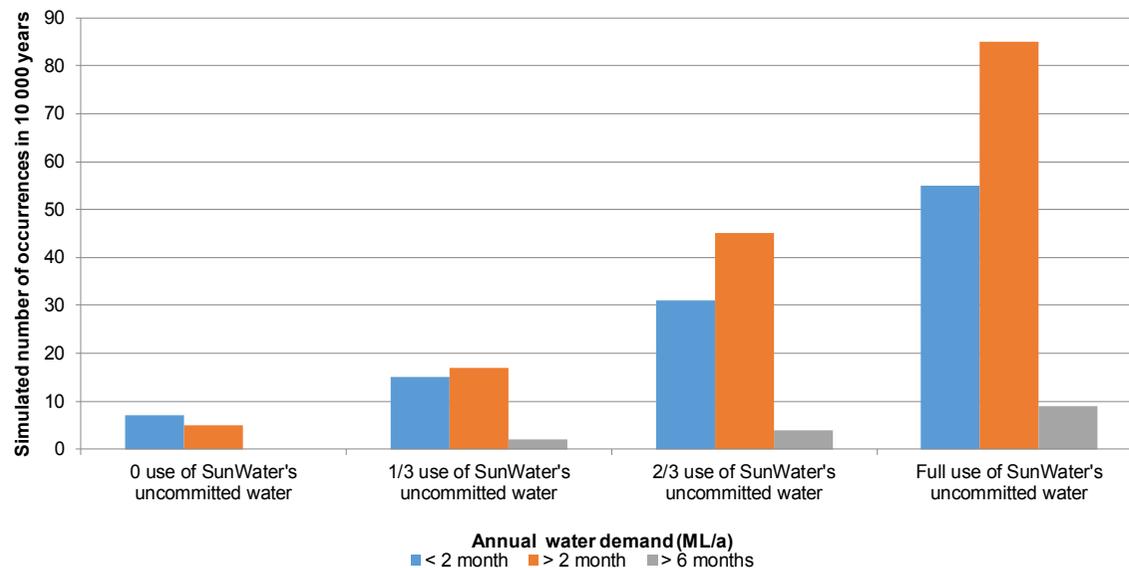


Figure 7: Frequency and duration of supply shortfall⁵

5. There are no instances of supply shortfall occurring in the stochastic modelling simulation period with low agricultural water use and SunWater’s uncommitted water entirely unused.



Conclusion

As highlighted previously, the assessment results illustrate that the current low average water use for agriculture and the non-use of SunWater's uncommitted water are providing a temporary benefit to the council's water supply performance from the Pioneer River WSS, which underpins Mackay's urban water supply security. However, this benefit cannot be relied upon indefinitely, as circumstances and water-use trends may change in the future.

The results presented in this assessment outline the potential changes to the council's water supply performance from the Pioneer River WSS and can be used to inform decisions by the council regarding the timing and extent to which additional water allocation may be required. Considerations such as the acceptable frequency of reaching low water levels in Dumbleton Rocks Weir, the underlying likelihood of not being able to meet demand and the potential implementation of water management measures are fundamental to the council's water supply planning.

Moving forward

This RWSSA represents a collaborative approach between the Department of Energy and Water Supply and the Mackay Regional Council to establish a shared understanding of the existing performance of Mackay's water supply and its capacity to support future growth.

Mackay Regional Council recognises the importance of ensuring the future security of water supply to Mackay communities. The process of developing the RWSSA in conjunction with the Department of Energy and Water Supply has provided a better shared understanding of the existing and future performance and security of Mackay's water supply from the Pioneer River WSS.

The following actions by the council will allow for better support for the security of supply:

- monitor Teemburra Dam levels as a lead indicator to increased risk of shortages
- continually review demand within the network to understand when and how much it will be necessary to increase the allocation to meet community's needs
- maintain relationships with key stakeholders to understand the commitment of the currently unallocated high-class A water in the Pioneer River WSS
- maintain current water demand management and provide education and real-time data to end users, while continually reviewing water losses within the network
- implement water restrictions during water shortages to limit exposure.

These actions will help guide how the council will balance appropriate levels of service for water supply security with community expectations.



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Regional Water Supply Security Assessment program
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