Department of Natural Resources, Mines and Energy

Mount Isa

regional water supply security assessment

MOUNT ISA CITY COUNCIL

Queensland Government

CS9703 12/19

This publication has been compiled by the Department of Natural Resources, Mines and Energy

The Queensland Government is committed to providing accessible services to Queenslanders from all culturally and linguistically diverse backgrounds. If you have difficulty in understanding this document, you can contact us within Australia on 13QGOV (13 74 68) and we will arrange an interpreter to effectively communicate the report to you.

Introduction

Mount Isa is a mining and commercial service centre in the heart of the Carpentaria Mount Isa Minerals Province in north-west Queensland. The region around Mount Isa contains large reserves of copper, silver, lead, zinc and other minerals.

Mount Isa is approximately 1800 km northwest of Brisbane and 900 km west of Townsville. The population of Mount Isa, which is predominantly a mining community, is projected to grow from approximately 18 600 in 2017 to 22 600 by the year 2041.

Safe, secure and reliable water supplies are critical for sustaining economic productivity in the area, as well as for the current and future well-being of the community. The Queensland Government (through the Department of Natural Resources, Mines and Energy) and Mount Isa City Council (Council) have partnered to investigate and establish a shared understanding of the capability of Mount Isa's water supply sources, namely the Moondarra Dam and Julius Dam water supply schemes, to support current demands and provide for future growth. Arising from this partnership, this regional water supply security assessment (RWSSA) provides valuable information to the community and water supply planners about Mount Isa's water supply security, thereby providing a foundation for future water supply planning.

This assessment has considered a number of demand scenarios to identify the potential timing and magnitude of water supply risks for Mount Isa. Based on the projected urban, mining and industrial water demands on the Moondarra Dam and Julius Dam water supply schemes, the assessment showed that Mount Isa's supply has a high level of reliability to at least 2041. It is important to note that the assessment adopted a projected demand that was based on average demands and assumptions regarding growth in the mining industry.

Information presented in this assessment considers the current capacity of the existing water supply sources for Mount Isa and associated infrastructure. The scope of the assessment is limited to the volume of available water and does not address water quality issues that may affect water supplies, or any changes to the capacity of the existing water supply system and associated infrastructure. 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.

Image courtesy of Tourism and Events Queensland

Image courtesy of Tourism and Events Queensland

Water supply sources

Mount Isa is supplied by two dams, each of which forms a water supply scheme—the Moondarra Dam Water Supply Scheme and the Julius Dam Water Supply Scheme.

Moondarra Dam is owned by Mount Isa Mines Glencore (MIM Glencore) and is located on the Leichhardt River about 16 km downstream from Mount Isa. The dam has a catchment area of 1070 km^2 and a storage capacity of 106 833 megalitres (ML). Construction of Moondarra Dam was completed by Mount Isa Mines in 1958 to supply water to the town and surrounding mines. There are a total of 26 300 ML per annum (ML/a) of medium priority water allocations available from the Moondarra Dam water supply scheme (WSS), including 1250 ML/a to cover distribution losses, and no high priority water allocations.

Julius Dam is owned by SunWater and is also on the Leichhardt River. It is located 74 km downstream of Moondarra Dam, approximately 70 km north-east of Mount Isa. The dam has a catchment area of 3730 km^2 and a storage capacity of 107 500 ML. Construction of Julius Dam was completed by SunWater in 1976 to augment the water supply from the Moondarra Dam WSS. There are a total of 48 850 ML/a of high priority water allocations available from the Julius Dam WSS, including 1250 ML/a to cover distribution losses, and no medium priority water allocations.

There are two bulk water service providers operating in the area—Mount Isa Water Board (MIWB) and SunWater. MIWB is responsible for the supply of bulk treated water to the Council, Mount Isa Mines, and MIWB's industrial customers, and uses both Moondarra Dam and Julius Dam to provide these supplies. MIWB, Council and MIM Glencore work closely together and apply an adaptive management and operating regime to maximise water availability from the two water supply sources.

Since Moondarra Dam is located closer to Mount Isa and Mount Isa Mines, there are lower operational costs when accessing water from this dam. MIWB therefore typically operates the water supply system with preferential take from Moondarra Dam to supply its customers. Water is generally sourced from Julius Dam by MIWB only when water levels in Moondarra Dam fall below about 25% of its storage capacity, or when water quality issues may impede the use of water taken from Moondarra Dam.

Water supplied by MIWB from each dam is firstly passed through a natural sedimentation pond (Clear Water Lagoon) located adjacent to Moondarra Dam. This step assists in water treatment processes before water is extracted and further treated at a microfiltration plant prior to distribution to urban customers.

SunWater supplies water from Julius Dam to its own customers and to customers of its wholly owned subsidiary, North West Queensland Water Pipeline Pty Ltd. This subsidiary company supplies water to Ernest Henry Mining through the North West Queensland Water Pipeline and also supplies water to Cloncurry via the Cloncurry Pipeline.

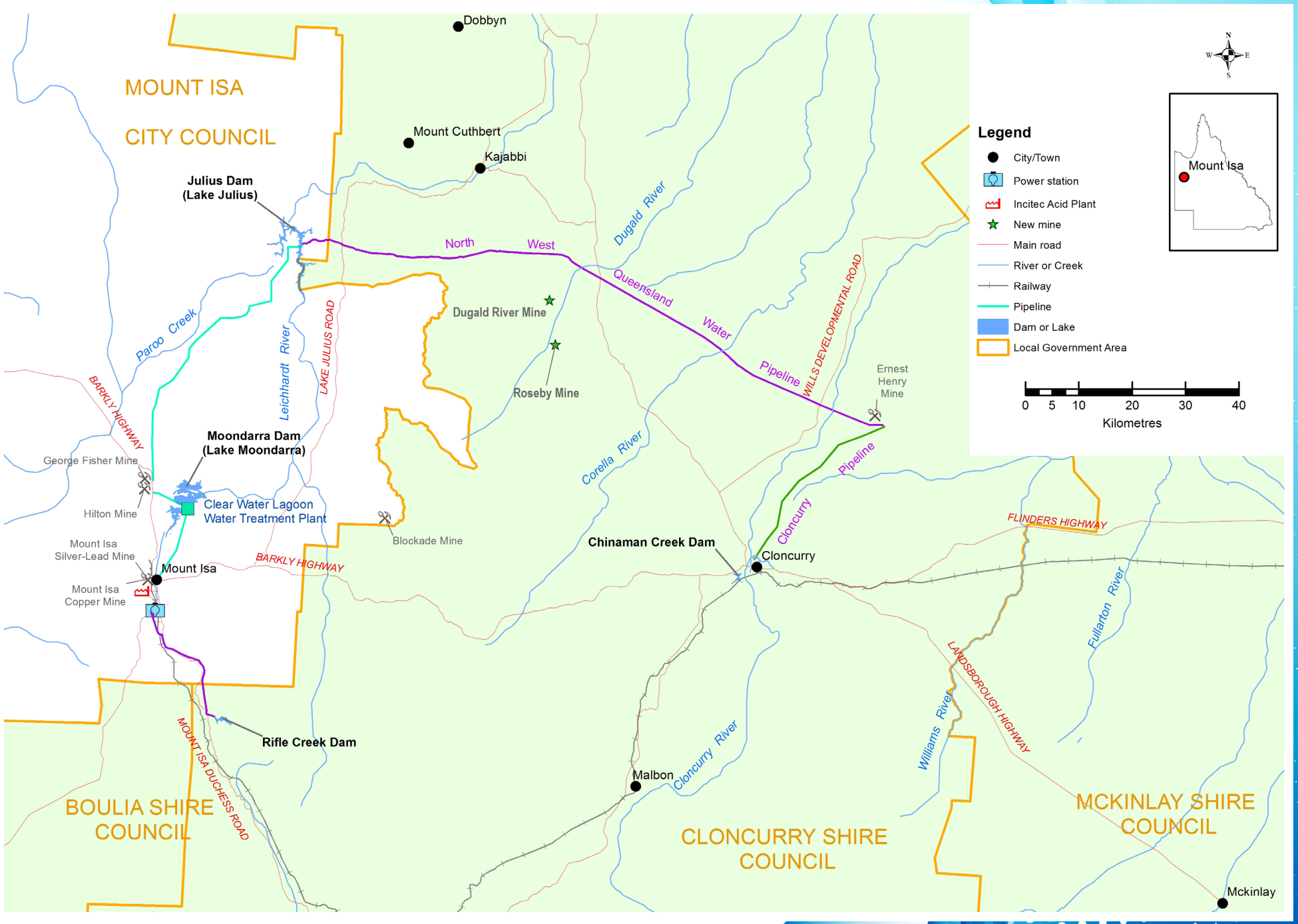

Figure 1: Location of Mount Isa, Moondarra Dam, Julius Dam, and the pipelines connecting the water supply systems

Water users and water demand

Mount Isa's reticulation network supplies treated water to the city's population, as well as to a number of small businesses and industries connected to the reticulation network. In addition, the reticulation network supports an estimated 1000 visitors (2017) to the area on a daily basis.

Mount Isa's reticulation network

Council holds 12 500 ML/a of medium priority water allocation from the Moondarra Dam WSS along with 7900 ML/a of high priority water from the Julius Dam WSS. Historical data shows that the total volume of water sourced (from MIWB's water treatment plant) for Mount Isa's reticulation network over the period 2008–09 to 2016–17 averaged approximately 6460 ML/a (ranging from 5527 ML/a to 7619 ML/a).

Based on the total volume of water sourced and the serviced population for each year, Mount Isa's average water demand during this period was 862 litres per capita per day (L/c/d). This figure accounts for residential, commercial, municipal, and industrial water supplied from the reticulation network, plus any system losses. It also includes water use by the transient population, such as tourists and temporary workforces. Water use by the transient population is accounted for under the category of commercial use; however, the transient population is not included in the serviced population figures.

The average residential water use during this period was 576 litres per person per day (about two thirds of the total urban water use).

Recycled water

Recycling of waste water from Mount Isa's water treatment plant commenced in mid-2017 when the upgraded Mount Isa Waste Water Reclamation Plant was officially opened. The upgraded plant provides a wide range of reuse options by turning effluent waste into Class A water that can, for example, be used to irrigate parks, gardens and sporting fields. The upgraded plant can produce up to 4 ML of recycled water per day, and Council is already using some of the available recycled water to irrigate more than 80 hectares, and there is potential for further uses.

The use of recycled water could potentially reduce demand on Mount Isa's reticulation system, particularly where the use of recycled water replaces the use of reticulated water, for example the watering of parks and gardens. Recycled water may also provide an opportunity to continue the greening of Mount Isa's municipal areas even during very dry periods when the urban water supply sources may be at reduced levels. Recycled water can also be used to increase the livability of an area by greening spaces that may otherwise not be irrigated.

Water demand is impacted by variations in climate

Urban water demand varies between years and within each year, depending on various factors including climatic conditions such as rainfall, with higher demand usually occurring during hotter drier periods. However, at times during extended dry periods dam levels may become very low and, as a result of water restrictions being applied, water use may be lower than it would otherwise have been.

Average rainfall for Mount Isa is about 431 mm/a. The long-term historical rainfall data for Mount Isa (1932–2017) is summarised in Table 1. Also shown in Table 1 is the average rainfall over the recent 2008–09 to 2016–17 period, which is higher than the average over the longer term (despite low annual rainfall during 2012–13 and 2013–14). The implications of this higher average rainfall on the average water demand figure are discussed in more detail later.

Figure 2 shows the total annual (July to June) rainfall recorded in Mount Isa (gauging station 29126 Mount Isa Mine) and the extent that the average daily water demand on Mount Isa's reticulation network varies from year to year for the period 2008–09 to 2016–17.

It can be seen from Figure 2 that urban water use tends to be high during periods of low rainfall and lower during periods of higher rainfall. However, water use is also impacted by water restrictions being imposed, which occurred during 2013–14 and 2014–15 as a result of low water levels in the dams and poor water quality. The poor water quality was the result of unusually large algal blooms occurring when water levels were low, and necessitated the installation of the current water filtration plant.

Mount Isa's water demand is also generally higher during hotter drier periods due to the maintenance of grass cover to minimise the community's exposure to mineralised soils found in the local area, and the use of evaporative cooling systems to counter the dry heat (Mount Isa's mean monthly maximum temperatures from November to February range from 35.5–37.2°C). Council has water savings and demand management strategies in place to counter high water consumption rates, which are discussed in more detail later.

In contrast to urban demands, mining and industrial water use is less affected by rainfall, as this water demand is driven by production.

Table 1: Summary rainfall statistics for Mount Isa

Rainfall station No. 29126 Mount Isa Mine.	Annual average (mm)	Median (mm)	Historic low (mm)	Historic high (mm)
1932 to 2017	431	381.5	104.9	1113
2008–09 to 2016–17	518	472.8	197.4	859.6

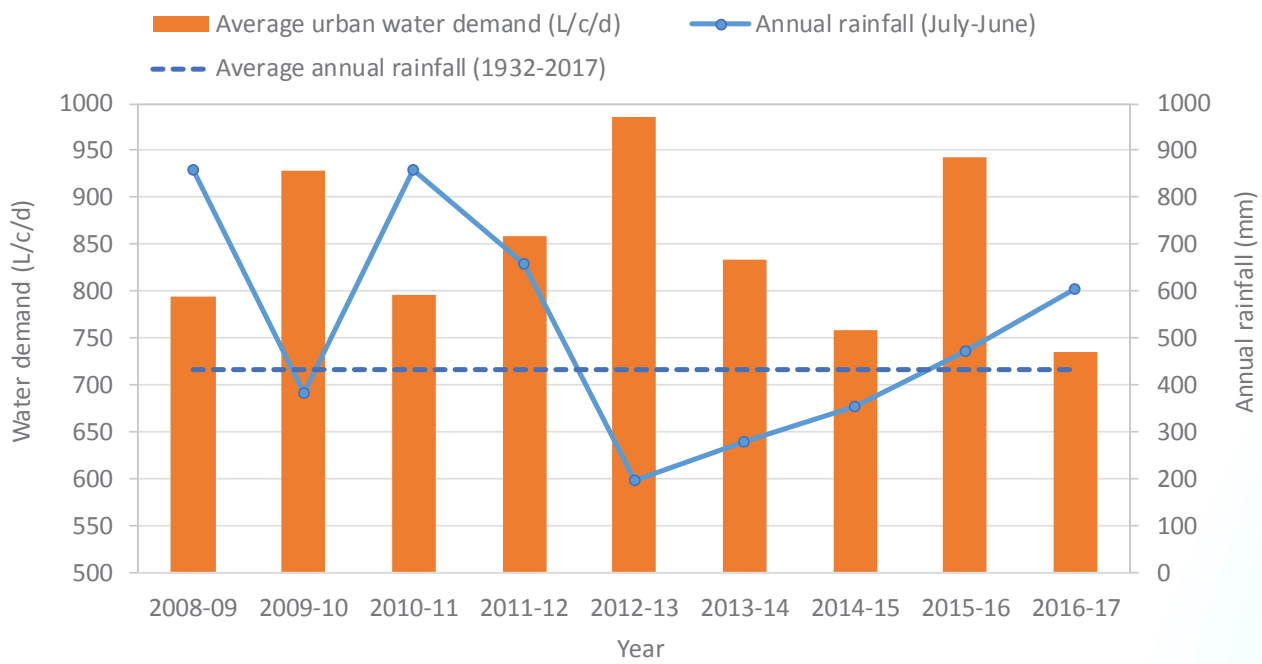

Figure 2: Annual rainfall and annual urban water demand for Mount Isa

Climate change

The Queensland Government provides scientific advice on climate change projections for 13 Queensland regions, including the North West Queensland region in which Mount Isa is located. Similar to the rest of Queensland, the projections indicate that the North West Queensland region will be warmer and drier with increased evaporation.

The projected climate changes may potentially result in reductions in water supply availability and increases in water demands within the region. Changes to demand, which may be driven by climate change, were captured in this assessment by taking into account a range of water demand levels and a wide range of potential future climatic scenarios which include extreme weather events.

Other users of the bulk water supply sources

Other urban areas

Up to 950 ML/a may be supplied to Cloncurry from the Julius Dam WSS via the North West Queensland Water Pipeline and the connecting Cloncurry Pipeline. Cloncurry has a population of about 2300 (June 2017), and has a number of local water supply sources—Chinaman Creek Dam, Cloncurry Weir and the Cloncurry River wells. In addition, during drier periods (or when otherwise required) water from Julius Dam may be provided to meet the urban demands of Cloncurry. Over the three years (2014–15 to 2016–17), an average of 575 ML/a was supplied to Cloncurry from Julius Dam. As this volume is metered at Council's water treatment plant, it does not include transmission losses incurred in the delivery of this volume from Julius Dam.

Mining and industry

Mining is the foundation of Mount Isa's development, with considerable volumes of water used for mining operations and associated industries in and around Mount Isa.

MIM Glencore holds 12 500 ML/a of medium priority (MP) water allocation in the Moondarra Dam WSS and 8850 ML/a of high priority (HP) water allocation in the Julius Dam WSS. Since 2014, water use by MIM Glencore has declined due to the introduction of water recycling practices, reducing from an average of 11 365 ML/a (from 2008–09 to 2013–14) to an average of about 8275 ML/a (2014–15 to 2015–16).

Mount Isa Water Board holds 5000 ML/a of HP water in the Julius Dam WSS from which it supplies bulk water to local industries, such as Incitec Pivot's acid plant (typically around 1600–1900 ML/a), and other customers.

North West Queensland Water Pipeline Pty Ltd holds a 15 000 ML/a HP water allocation in the Julius Dam WSS, with the primary use to supply Ernest Henry Mining (EHM) through the North West Queensland Water Pipeline. In 2014, EHM reported that they had cut their water use from Julius Dam by half (citing an average reduction of 200 ML/month, or about 2400 ML/a) through the construction of an additional water storage facility known as the Capture and Re-use Dam.

Agriculture

The cattle industry is the main agricultural land user in the Mount Isa region; however, there are no specific water allocations currently held by agricultural users from the Moondarra Dam and Julius Dam WSS. The water needs of the cattle industry are primarily sourced from local farm dams and ground water sources. However, some of Mount Isa Water Board's allocation is supplied to some local agricultural businesses.

Uncommitted water

While there is no uncommitted water in the Moondarra Dam WSS, as at June 2018 there was about 20 000 ML/a of uncommitted HP water allocation in the Julius Dam WSS:

- SunWater currently holds 10 850 ML/a of HP water allocation, most of which is still uncommitted.
- SunWater's subsidiary, North West Queensland Water Pipeline Pty Ltd, hold 15 000 ML/a of HP water allocation, of which around half is uncommitted.
- Mount Isa Water Board holds 5000 ML/a of HP water allocation of which about 2350 ML/a is uncommitted.

This uncommitted water could potentially be leased or purchased from the entitlement owners. In the meantime, having uncommitted water in Julius Dam improves the water security for existing customers.

Historical performance of Moondarra Dam and Julius Dam

Moondarra Dam is used as the preferential supply source for Mount Isa, due mostly to its close proximity and associated lower operational costs than Julius Dam. Moondarra Dam also has a much larger surface area than Julius Dam and therefore experiences greater losses through evaporation, which adds further incentive to using the water from Moondarra Dam first.

Due to the higher use and higher evaporation losses, water volumes in Moondarra Dam frequently become relatively low. Since the early 1980s, Moondarra Dam has experienced about 15 occasions when the storage has fallen below 25% of its capacity, for periods ranging from a few weeks to nearly a full year.

However, during the same period, water levels in Julius Dam generally remained above 80% of storage capacity, occasionally falling to lower levels as a result of increased use to supplement supplies from Moondarra Dam.

While the combined volumes of these two dams indicates a significant volume remaining in the storages over time, historical performance is largely a result of historical usage (combined with evaporation and other losses). Water use data for the last ten years shows that considerably less than half of the total entitlement volume was extracted from the system each year, and yet storage levels during this period fell to quite low levels—performance of the system would have been significantly worse under full entitlement use.

The recorded storage volumes in Moondarra Dam and Julius Dam are shown as a percentage of their respective full supply volumes in Figure 3.

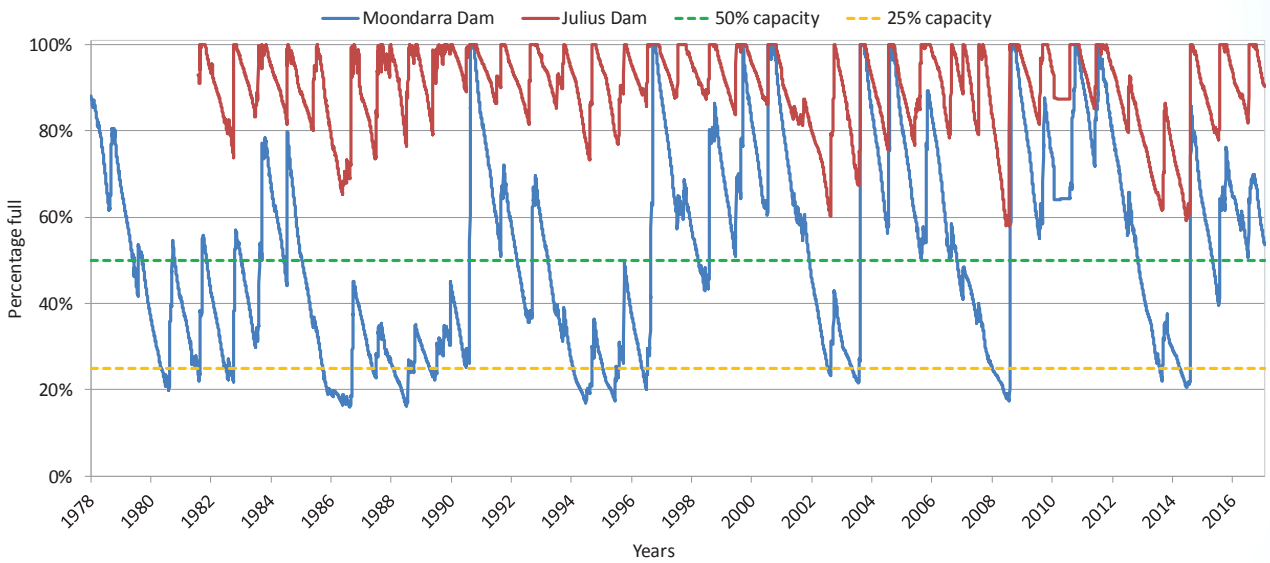

Figure 3: Moondarra Dam and Julius Dam water levels

Image courtesy of Tourism and Events Queensland

Image courtesy of Tourism and Events Queensland

Future water demand

To enable well-founded water supply planning, it is essential to have a sound understanding of the possible changes to water demand that may occur in the future due to Mount Isa's population growth, as well as future mining and industry demands.

Mount Isa's reticulation network

Based on the Queensland Government Statistician's Office estimates, the resident population of Mount Isa is projected to grow at a rate of about 0.7% per annum from about 18 600 in 2017 to about 22 600 in 2041. This trend will likely be driven by growth in the mining sector and supporting industries. However, under a (high growth) scenario of an early upturn in the mining industry, this growth rate may be preceded by a population influx (that restores Mount Isa's population to somewhere around its 2011 population of nearly 21 500) before steadily rising over subsequent years.

A water demand projection for Mount Isa's reticulation network has been developed based on the projected population growth rate of about 0.7% per annum and a water demand of 862 L/c/d (the average water demand for Mount Isa's reticulation network during the period 2008–09 to 2016–17). This water demand figure represents average demand during a relatively wet period, rather than high demand such as may occur during hotter dry periods, and therefore this average daily demand level will often be exceeded. However, the combined supply sources of Moondarra Dam and Julius Dam have the capacity to supply water to Mount Isa through multiple years, and the impact of fluctuating demand levels on the combined storage volume is generally averaged out. The use of an average demand figure provides a means of directly comparing future demand projections to determine when demand is likely to exceed available supply. For planning purposes, this means an appropriate balance can be reached between the cost of water supply and the demand for available water.

The projected water demand for Mount Isa is shown below in Figure 4, and indicates that Mount Isa's average annual urban water demand is likely to reach about 7120 ML/a by the year 2041, or potentially as high as about 8350 ML/a under a 'high growth' scenario—actual water demand in any particular year may be higher or lower for a variety of reasons, including variations in climatic conditions.

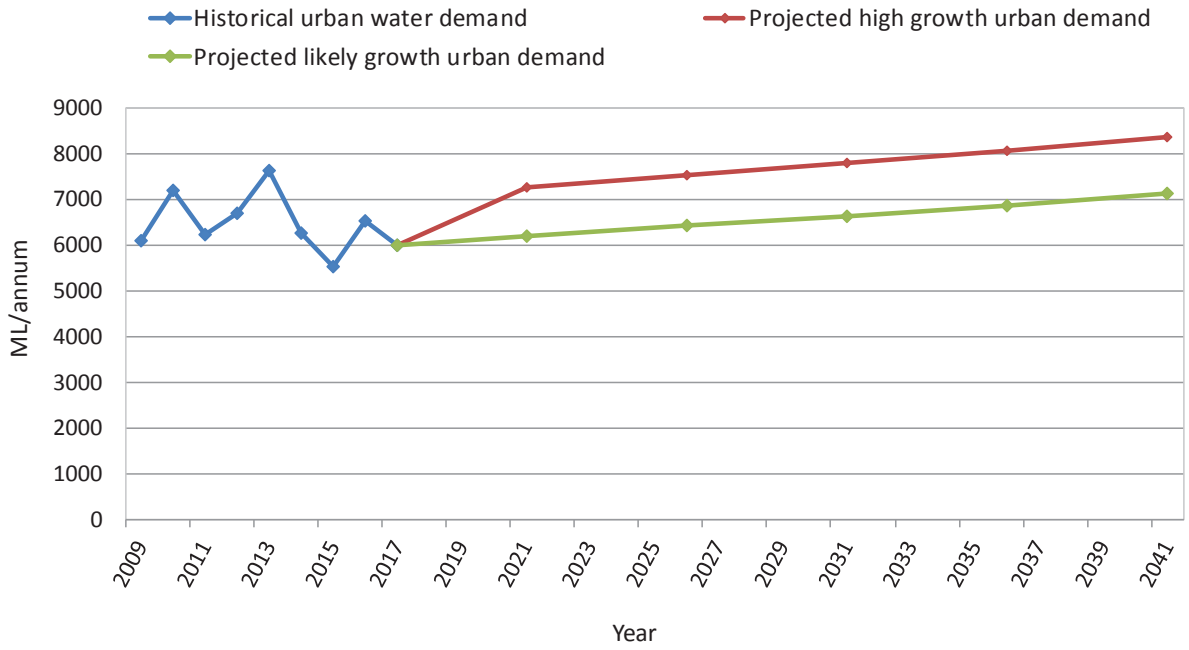

Figure 4: Historical and projected urban water demand for Mount Isa

Recycled water

Water demand that is met through the use of recycled water from Mount Isa's upgraded treatment plant has not been included in the projected demands for Mount Isa. If, for any reason, this new recycled water supply becomes unavailable in the future and some reliance on this supply has developed, some of this demand may switch to Moondarra Dam and Julius Dam.

Image courtesy of Tourism and Events Queensland

Other users of the bulk water supply sources

Other urban areas

As mentioned earlier, Cloncurry may receive up to 950 ML/a from Julius Dam via the North West Queensland Water Pipeline and the Cloncurry Pipeline. Although Cloncurry may not need to use the full volume of this water each year, under existing contractual arrangements this volume is reserved for Cloncurry from SunWater's North West Queensland Water Pipeline entitlement. For the purpose of this RWSSA, therefore, it is anticipated that Cloncurry's need for this volume will continue into the foreseeable future.

Mining and industry

Regional growth in the mining industry is subject to external influences such as commodity prices and the international market. In 2014, the then Department of State Development, Infrastructure and Planning (DSDIP) had an assessment undertaken of the water demand for mines across the North West Minerals Province, which included mines in operation as well as potential mines which may be serviced from the Moondarra and Julius Dam WSSs in the future. The assessment included both high-growth and low-growth water demand projections from 2013 to 2033. The projections were based on literature reviews, company surveys, and modelling of water demands based on estimates of proven or inferred ore reserves.

For the Mount Isa RWSSA, a water demand projection for the mining and industry sector has been developed using a combination of the information from the DSDIP report, information obtained from existing and potential mining projects in the region, and information provided by water service providers, with these projections extended to 2041. These projections represent water demand at the mining/industry sites and therefore do not include water losses associated with the treatment or delivery of that water from the supply source (Moondarra Dam or Julius Dam). As the timing and scale of mining developments is subject to many factors, the demand forecast used in this assessment is necessarily based on assumptions about mining industry growth and information available at the time of development of the assessment.

The mining life of Ernest Henry Mine, which is serviced by the North West Queensland Water Pipeline from Julius Dam, has been extended to at least 2026 as a result of the transition to underground mining operations. The subsequent closure of this mine would reduce future water demand. Additionally, the Dugald River mine officially opened in late 2017, and commercial production was achieved in 2018. Development of the nearby Roseby (Little Eva) deposits is also anticipated to occur in the near future.

Under both 'high growth' and 'low growth' scenarios (Figure 5), mining (and industry) water demand is predicted to remain relatively steady until declining from 2024 (with demand reducing as some operations cease). Under a 'high growth' scenario this decline is expected to level out at about 17 000 ML/a around 2027, while under a 'low growth' scenario demand is expected to decline more quickly and level out at about 10 400 ML/a around 2029.

Figure 5 shows the adopted water demand projections for the mining and industry sector, illustrating the high and low mining demand growth scenarios for the Mount Isa area.

Total water demand on the Moondarra Dam and Julius Dam WSSs

The total volume of water demand by each sector (MIM, MIWB, Council and the North West Queensland Water Pipeline) influences the water supply security of the system and other user sectors. Changes to the timing and scale of mining and associated industrial developments can result in a change to the total water demand forecast or a shift in the indicated timeframes for forecast water demands to eventuate.

Figure 6 shows the projected combined total water demand on the Moondarra Dam and Julius Dam water supply schemes for all of the water use sectors including Mount Isa's urban use, Cloncurry's potential urban use, mining, industry and losses (including treatment and distribution losses).

The 'high growth total demand' shown in Figure 6 represents the 'high' growth demand for urban water demand (from Figure 4) combined with the 'high growth' mining demand (from Figure 5), plus assumed constant demands of 950 ML/a for Cloncurry and 1200 ML/a for distribution losses. The 'low growth total demand' shown in Figure 6 represents the 'likely' urban demand (from Figure 4) combined with the 'low growth' mining water demand (from Figure 5), plus assumed constant demands of 950 ML/a for Cloncurry and 1200 ML/a for distribution losses. As illustrated, under both scenarios the total demand is projected to grow marginally until 2023, peaking at about 30 000 ML/a under the high growth scenario, before a stepped decline and levelling out. The opening of new mines that rely on water from Moondarra Dam or Julius Dam, or extending the life of existing mines may alter this projection.

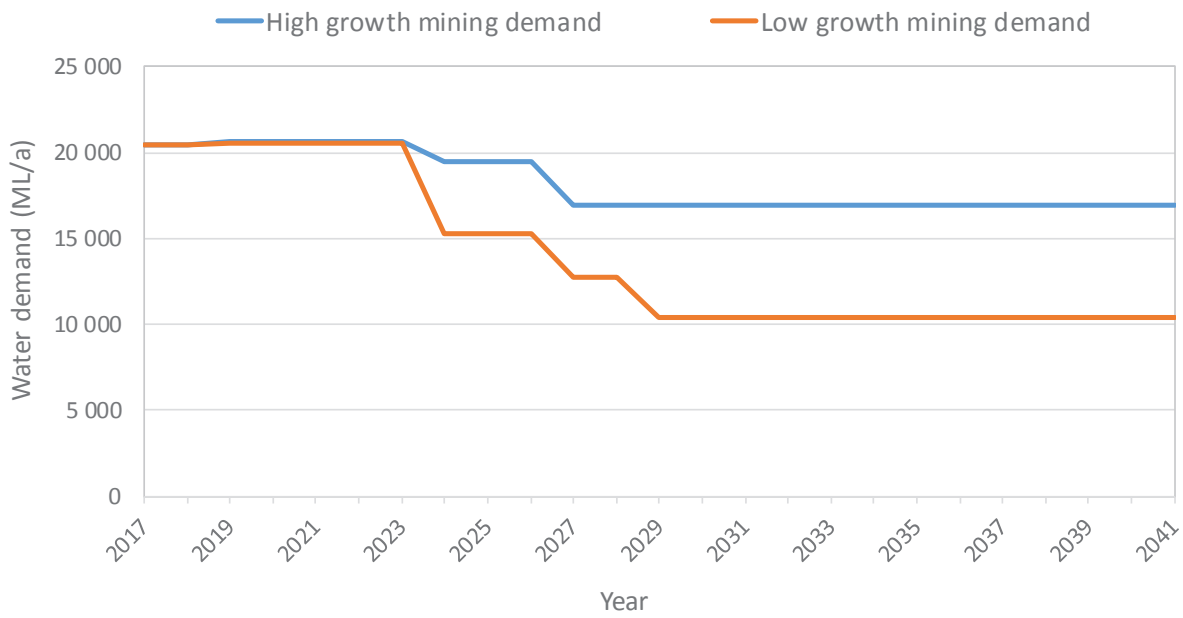

Figure 5: Projected water demands from the mining sector on the Moondarra Dam and Julius Dam WSSs

Note: - water demands shown in Figure 5 do not include any water losses for delivery from dam to mine site

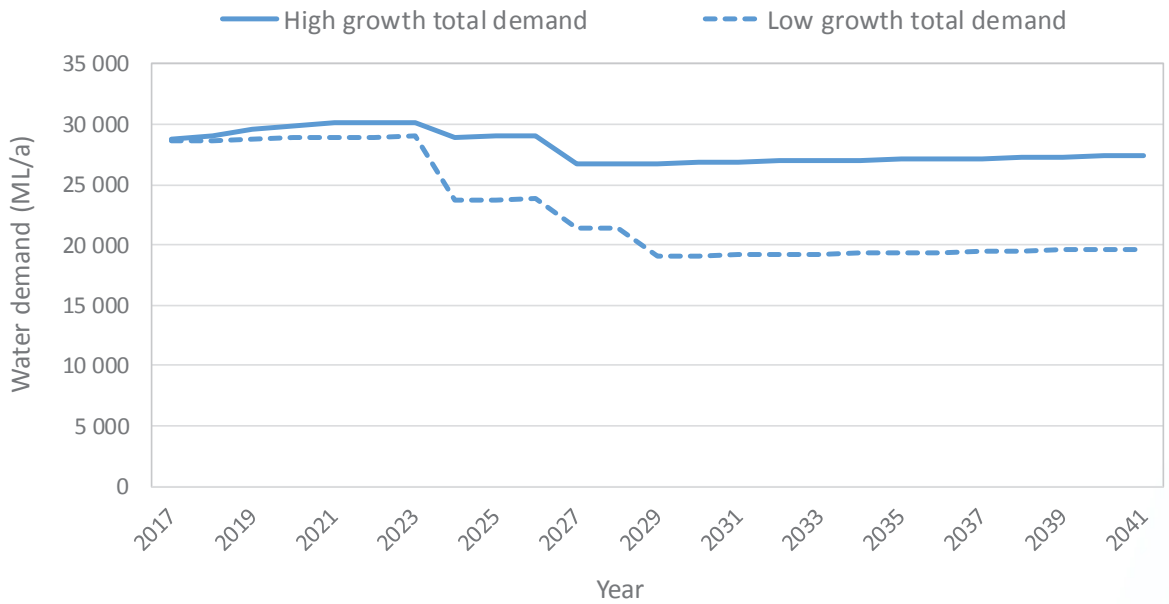

Figure 6: Total water demand projections for the Moondarra Dam and Julius Dam WSSs

Image courtesy of Tourism and Events Queensland

Image courtesy of Tourism and Events Queensland

Water supply system capability

Hydrologic assessments have been undertaken to determine the capability of Mount Isa's existing bulk water supply system to meet current and projected future water demands.

Hydrologic assessment of Mount Isa's water supply system

Both historical and stochastic modelling techniques were used to simulate the performance of Mount Isa's water supply from Moondarra Dam and Julius Dam. Historical modelling was used to demonstrate how the water supply would have performed under historical climatic conditions for a range of total demand levels. Stochastic modelling was used to demonstrate how the water supply may perform under a wider variation of potential climatic scenarios, including during more severe droughts than those in the historical record.

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 Julius Dam and Moondarra Dam catchment areas (and the Cloncurry catchment area), and hydrologic modelling of each of the 100 replicates undertaken. Median outputs from the stochastic modelling have been presented in this assessment. Using the median outputs means that half of the replicate sequences had a lower frequency and half had a higher frequency of an event occurring.

The hydrologic assessments assumed full use of all existing water entitlements, with the exception of the entitlements associated with the Moondarra and Julius Dam water supply schemes, and those associated with Cloncurry. For the Moondarra and Julius Dam water supply schemes, a range of total water demands comprising assumed demands from each sector (urban, mining, etc.) were assessed, up to and including the full usage of all water allocations (75 150 ML/a).

Water restrictions

The hydrologic assessments included the application of water restriction regimes (current at the time of the assessment) for urban supplies as well as for mining and industrial customers, as shown in Table 2 and Table 3, respectively.

Council's water restriction regime is designed to conserve water during periods of low water availability, as shown in Table 2. Council's water restrictions are targeted at reducing the cost of water supply while providing water to meet community expectations and balancing out available supplies. As there is considerable operational cost-saving associated with accessing water from Moondarra Dam, the severity of water restriction levels increases as the trigger for accessing water from Julius Dam approaches.

Table 2: Council's water restrictions regime trigger levels and response

Water restrictions levels	Moondarra Dam storage volume	Julius Dam storage volume	MICC demand reduction target (& percentage reduction applied to Mount Isa urban demands modelled)
Level 1	Above 52%	Above 86%	Permanent conservation measures
Level 2	At or below 52%	At or below 86%	13% demand reduction
Level 3	Below 30%	Below 68%	29% demand reduction

Note: Trigger levels and reduction targets are subject to review and amendment as determined by Council.

Mining and industrial customers have their own water restriction regime to reduce water demand during periods of low water availability. MIWB and SunWater impose water restrictions based on the total combined available water in Lake Moondarra and Lake Julius, as shown in Table 3.

Table 3: Mining and industrial water restriction regime trigger levels and response

Water restrictions levels	Combined storage capacity of Moondarra Dam and Julius Dam	Mining & Industry demand reduction target (& percentage reduction applied to mining and industry demands modelled)
Industry Level 1	Above 30% and at or below 40%	20% demand reduction
Industry Level 2	Above 20% and at or below 30%	30% demand reduction
Industry Level 3	Above 10% and at or below 20%	40% demand reduction

Frequency of water restrictions and water supply shortfalls

For this assessment, Mount Isa is considered to have experienced a water supply shortfall when its water supply system is unable to meet the water demands placed on it by the community. This could, for example, occur as a result of the water supply sources reaching minimum operating volume due to severe or extended drought, or as a result of the demand on the available supply sources exceeding the entitlement volume.

As this assessment is about the capability of the existing bulk water resource, there is no accounting for potential water supply shortfalls resulting from other factors, such as an inability to meet demand as a result of water quality issues, or a pump, pipeline or treatment plant failure.

Likelihood of Mount Isa experiencing water restrictions and supply shortfalls

Figure 7 shows the frequency of water levels being below the various water restriction trigger levels for Mount Isa's urban water supplies under a number of water demand scenarios. The total water demand in the figure represents the water demand from the combined Moondarra Dam and Julius Dam WSSs from all users (including Mount Isa's urban demand, Cloncurry's 950 ML/a potential demand, mining and industry demand, and distribution losses). As an example, under a total water demand of 25 000 ML/a (approximate demand in 2024 under a 'low growth' scenario), it is estimated that storage volumes may be below Council's Level 3 water restrictions trigger level approximately once in 10 years on average (see label 'A' on graph). Under a total water demand of about 30 000 ML/a (close to current demand), the average recurrence of storage volumes being below the trigger level for Council's Level 3 water restrictions increases to approximately once in 7 years (see label 'B' on graph).

However, assuming that water restrictions are applied when triggered, for demands up to about 35 000 ML/a (higher than projected demands) the likelihood of the combined water supply system of Moondarra and Julius dams failing to meet Mount Isa's urban demand is less than once in 10 000 years on average. The likelihood of failure to meet Mount Isa's urban demands increases to about once in 1000 years on average for total water demands of 48 000 ML/a (see label 'C' on graph) and about once in 115 years for total water demands of 75 150 ML/a (see label 'D' on graph).

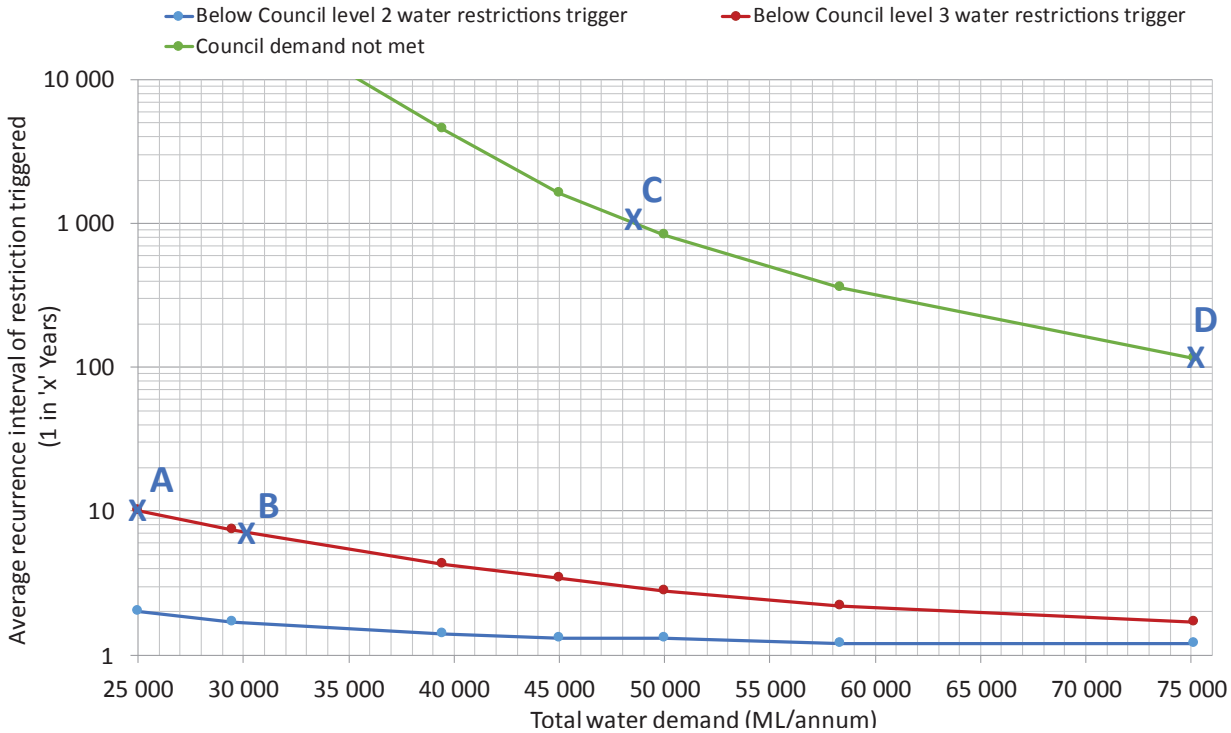

Figure 7: Frequency of water levels being below Council water restriction trigger levels and supply shortfalls occurring at various total annual demands

Duration and severity of Mount Isa water restrictions

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.

Figure 7 shows that, for a water demand of about 30 000 ML/a, the frequency of storage volumes being below the trigger level for Level 3 urban water restrictions is about once every 7 years on average. Figure 8 shows that over half of these restriction periods last longer than 1 month. Of the Level 3 water restrictions that last greater than 1 month, only about one third last longer than 6 months, with about one third of those lasting longer than 12 months.

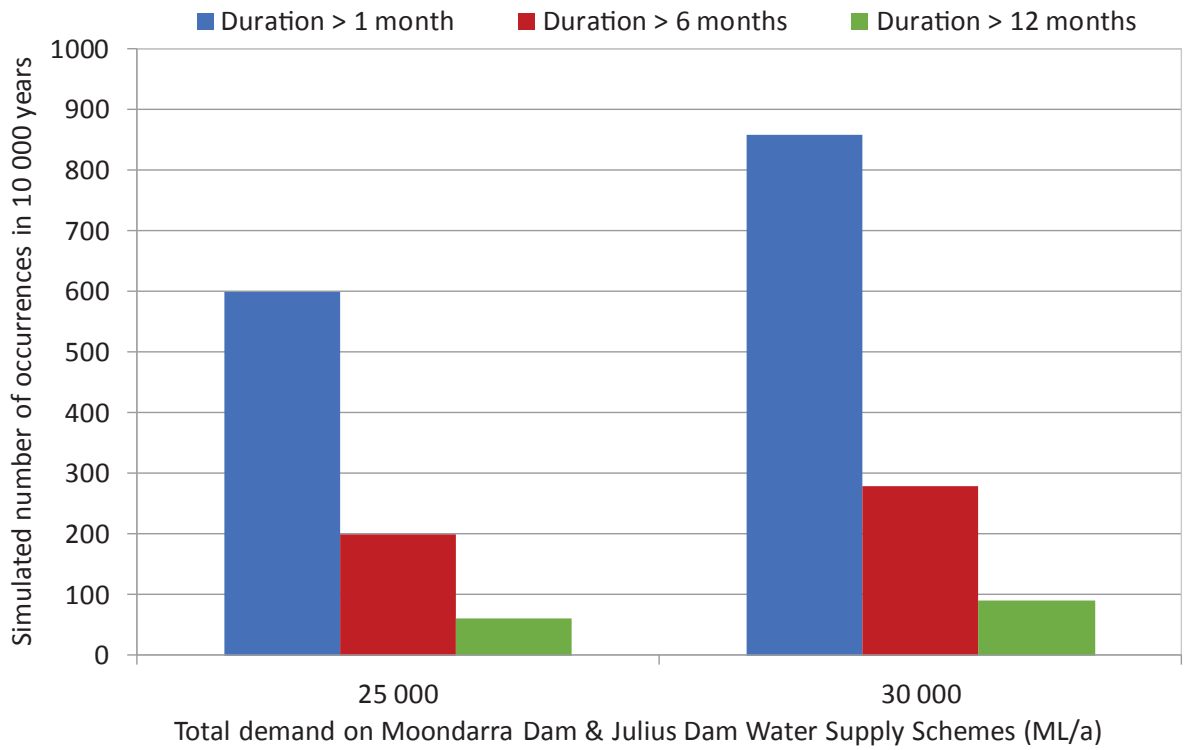

Figure 8: Number of occurrences of storage volumes in Moondarra Dam and Julius Dam being below the trigger level for Level 3 urban water restrictions that last for longer than 1, 6 and 12 months

Figure 8 also shows the extent that, with increased levels of total water demand, the occurrence of storage volumes being below the trigger level for Level 3 urban water restrictions increases.

Together, the frequency, severity and duration of water restrictions, along with the ability to maintain a minimum supply volume during drought, are fundamental parts of water supply planning and form part of the 'level of service'. The level of service for Mount Isa's urban supply is a matter for Council to determine, in discussion with the community. Considerations such as determining an acceptable frequency of the various restriction levels and the underlying likelihood of not being able to meet demand are critical parts of the water supply planning currently being undertaken across Queensland.

Image courtesy of Tourism and Events Queensland

Image courtesy of Tourism and Events Queensland

Likelihood of mining and industrial water restrictions

Figure 9 shows the frequency at which storage levels may be below the various industry water restrictions triggers for MIM, North West Queensland Water Pipeline, SunWater customers and other industrial customers not supplied from Council's reticulation network. The total water demand in the figure represents the water demand from the combined Moondarra Dam and Julius Dam WSSs from all users (including Mount Isa's urban demand). As an example, under a total water demand of 25 000 ML/a, storage volumes are estimated to be below the trigger level for Industry Level 3 water restrictions approximately once in 770 years on average (see label 'A' on graph). At an increased demand of 30 000 ML/a, the estimated average frequency of storage levels being below the trigger level for Industry Level 3 water restrictions approximately doubles (increasing to about once in 350 years on average—see label 'B' on graph).

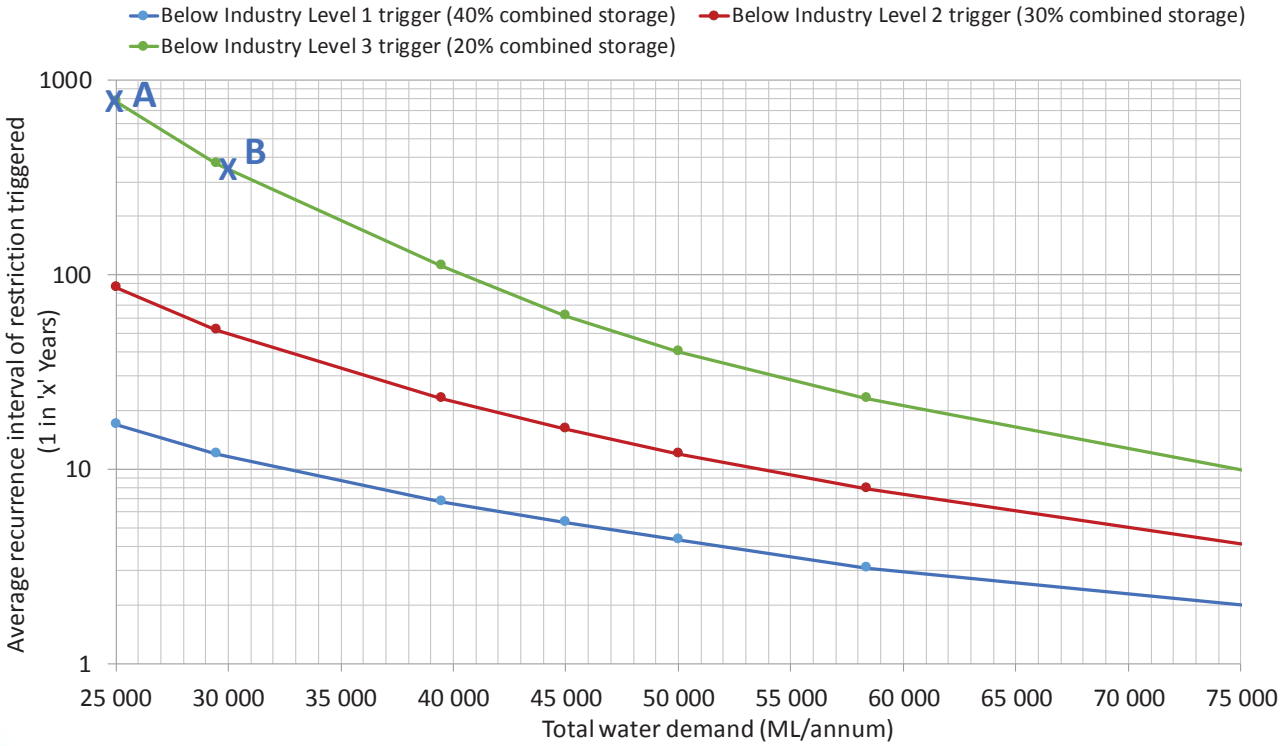

Figure 9: Frequency of water levels being below MIM Glencore and industry water restriction trigger levels for various total annual demands

Conclusions

This assessment shows that Mount Isa's urban supply has a high level of reliability to at least 2041. Over the next few years, the average total water demand on the Moondarra Dam and Julius Dam water supply schemes from urban, mining and industrial water use combined is projected to increase slightly from current demands to reach about 30 000 ML/a. Demand is then projected to decline over the following few years, with the extent of decline dependent on demand from the mining and industry sector. It is important to note that this demand projection is based on average demands, as well as assumptions regarding growth in the mining industry.

At current demands, storage levels may be below the trigger for Level 3 Council water restrictions (which targets a 29% reduction in use) about every 7–8 years on average. However, the likely occurrence of the combined water supply system of Moondarra Dam and Julius Dam failing to meet Mount Isa's urban water demand is less frequent than once in 10 000 years on average (this applies to total demands up to about 35 000 ML/a, assuming that water restrictions are applied when triggered).

It is important to note that the current and projected water demand levels are significantly below the combined volume of all water allocations in the system (75 150 ML/a). Performance of the water supply system significantly reduces as water demands increase toward this higher volume. The frequency of Mount Isa's urban water demand not being met increases to an average of about once in 1000 years for total annual water demands of 48 000 ML/a, and about once in 115 years for total water demands of 75 150ML/a.

Image courtesy of Tourism and Events Queensland

Moving forward

This RWSSA represents a collaborative approach between the Queensland Government and Mount Isa City Council to establish a shared understanding of the existing security of Mount Isa's water supply and its capacity to support future growth.

Water security is essential for the continued growth and prosperity of the Mount Isa region. Mount Isa City Council is committed to ensuring that the community has a secure, safe and reliable water supply to meet the needs of residents and businesses now and into the future.

Council proactively works to maintain an efficient and sustainable water supply to the community through a wide range of initiatives that include:

- regular monitoring to reduce water losses (e.g. from leaks or broken pipes)
- recycling of water to reduce demand on the urban reticulation system
- community education to help promote efficient and wise water use
- a staged program of replacing ageing water meters to ensure that water use is recorded accurately
- a tiered tariff structure for water charges so that customers who use water wisely benefit from their actions

Council has worked closely with the Queensland Government to collate detailed data and undertake hydrologic modelling to provide a better shared understanding of any potential water supply risks for the community. Council intends to incorporate the findings from this RWSSA into its future planning activities.

Through a combination of the above initiatives and planning, Council is ensuring that the community of Mount Isa can expect a secure and reliable water supply beyond 2041, based on current and projected future water demands. Mount Isa's residents and businesses can continue to contribute to the efficient use of the available water resources through using water wisely and ensuring appliances are water efficient.

Image courtesy of Tourism and Events Queensland

For more information on the Regional Water Supply Security Assessment program please visit

dnrme.qld.gov.au