Roma

urban water security assessment

maranoa REGIONAL COUNCIL

Queensland Government

CS10252 8/21

This publication has been compiled by the Department of Regional Development, Manufacturing and Water

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.

Summary

The town of Roma is located at the junction of the Warrego and Carnarvon highways, 480 km north-west of Brisbane and 270 km west of Dalby. Roma is a thriving service centre supporting the agricultural and energy sectors within the Maranoa region.

The Queensland Government Statistician's Office June 2019 estimate of Roma's population was 6915. Growth in Roma's population is forecast to occur at the rate of 0.4% per annum over the next twenty years and be around 8000 by 2050.

Safe, secure and reliable water supply is an essential resource for Roma, not only providing for the health and wellbeing of the community, but also providing opportunities for economic and community enhancement. Maranoa Regional Council (Council) is the registered water service provider, under the *Water Supply (Safety and Reliability) Act 2008*, providing both drinking water and wastewater services. Roma's water supply source is groundwater sourced from aquifers that are part of the Great Artesian Basin (GAB).

The Queensland Government, through the Department of Regional Development, Manufacturing and Water (DRDMW), and Council have, in partnership, investigated Roma's existing urban water supply system and its capacity to support current demands and future growth. This urban water security assessment (UWSA) presents an evaluation of the balance between Roma's current and future water demands and available groundwater supplies, to develop a shared understanding of Roma's urban water supply security and providing valuable information for future water supply management by Council.

Growth in future water demands for the Roma community was considered, to identify the timing and magnitude of any water supply security impacts. Historical bore data and the results of regional groundwater aquifer system modelling undertaken by the Queensland Government to support its management of the Coal Seam Gas (CSG) industry near Roma underpin the key findings from this assessment, which include:

- There have been significant drawdowns in the Gubberamunda Sandstone aquifer as a result of around 85% of Roma's water supply extraction being from this aquifer (noting the balance is drawn from the Mooga Sandstone aquifer), and these drawdowns extend a considerable distance from town.
- Groundwater levels in the Gubberamunda Sandstone aquifer are likely to continue to decline if the current rate of extraction is maintained even during years of average to above average rainfall.
- The local long-term impacts of town water extractions from all GAB aquifers accessed should be closely monitored with a view to managing future groundwater levels and extractions.
- Local groundwater assessment and modelling is recommended as a decision support tool to assist in the management of water extractions particularly from the Gubberamunda Sandstone aquifer.
- A number of older bores have been identified for decommissioning and replacement.
- Above ground storage volume only provides for one days' supply and the replacement of aging mains is seen as a priority.
- Potential changes in water demand in the vicinity of Roma's town bores and impacts on water levels will need to be monitored and regularly assessed as additional groundwater take for nearby agricultural purposes is currently not prohibited under the *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017*; noting that Council currently holds the largest entitlement from the Mooga and Gubberamunda Sandstone aquifers (i.e. 3225 megalitres per annum (ML/a) out of a total of 3773 ML/a of entitlements and estimated extractions within 25 km of Roma).
- Water restrictions, in addition to permanent water conservation measures, may on occasion need to be applied, primarily during extended dry periods, to manage extraction rates from some town bores.
- Although the water from some bores has recorded slightly higher than desirable levels of pH and salinity in the past, the treated water has otherwise consistently met the minimum chemical standards outlined in the Australian Drinking Water Guidelines.

Council is taking a proactive approach as outlined in the Moving Forward section of this assessment to provide an appropriate level of water supply security for Roma, and to ensure that the right environment exists for the community, businesses, industry and tourism to continue to thrive in Roma.

Water supply sources

Roma's water supply source is from Great Artesian Basin aquifers.

The Maranoa Regional Council owns 14 bores that tap the Great Artesian Basin to supply Roma's town water supply, as shown in Figure 1. The supply to the town was artesian until the 1950's, however has since become subartesian.

Council holds four groundwater licences to extract up to 3425 ML/a in accordance with the Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017 for Roma's town water supply and irrigation. These include licences to extract:

- 300 ML/a from the Surat Mooga Sandstone groundwater sub-area
- 2895 ML/a from the Surat Gubberamunda Sandstone groundwater sub-area
- 30 ML/a from the Surat Gubberamunda Sandstone groundwater sub-area (for irrigation), and
- 200 ML/a from the Surat Hutton Sandstone groundwater sub-area

Annual groundwater extractions range from around 40 to 440 ML/a per bore with the pumps in some bores operating for more than 16 hours per day. Some water treatment including pH correction and disinfection occurs at most bore-heads. Above ground storage volume only provides for one days' supply and the replacement of aging mains is seen as a priority.

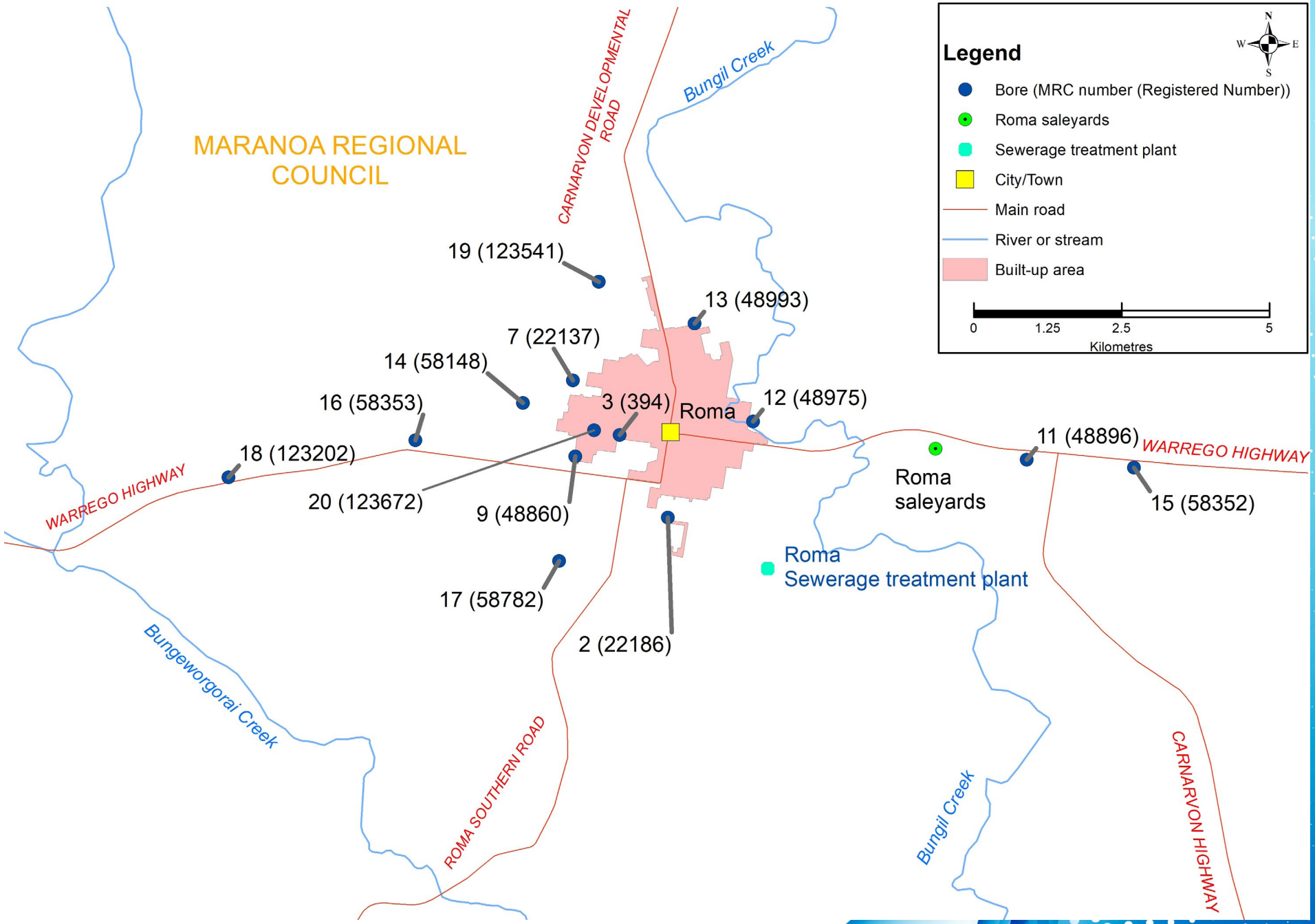

Figure 1: Location of Roma and Council's associated town water supply bores

Roma's town water demand

Roma's reticulation network provides water for urban purposes to about 7000 people (as of June 2019).

Information reported to the department by Council via the Statewide Water Information Management database shows that the total volume of water sourced for the Roma reticulation network over the 12 years from 2008–09 to 2019–20 averaged 2111 ML/a (ranging from 1456–2794 ML/a).

Based on the total volume of water sourced and the serviced population, the average water demand during this period was 817 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 some of the transient population, such as tourists and workforce personnel staying in hotels and motels. Accordingly, water use by the transient population is, in part, accounted for under the category of commercial use. In the past some water was carted to outlying construction camps from unmetered standpipes and consequently this water has been accounted for separately as part of non-revenue water.

The average residential water use for this period was 476 litres per person per day (L/p/d).

Recycled water use

A portion of the water supplied through Roma's reticulation network is collected and treated at Roma's wastewater treatment plant. This water is recycled and used for golf course and agricultural irrigation. Water demand that is met through the use of recycled water is not included in the current or projected demands on the Roma reticulation network.

Climatic variability impacts on water demand

Urban water demand varies between years and within each year, depending on climatic conditions and factors such as rainfall and temperature. Higher demands usually occur during hotter, drier periods.

Figure 2 shows Roma's annual rainfall for the period 2008–09 to 2019–20, and the total volumes of water sourced each year for Roma's reticulation network over the same period. During this period, the volume of water sourced varied considerably from year to year, ranging from approximately 563 L/c/d during a relatively wet year (2010–11) to 1048 L/c/d in a relatively dry year (2013–14).

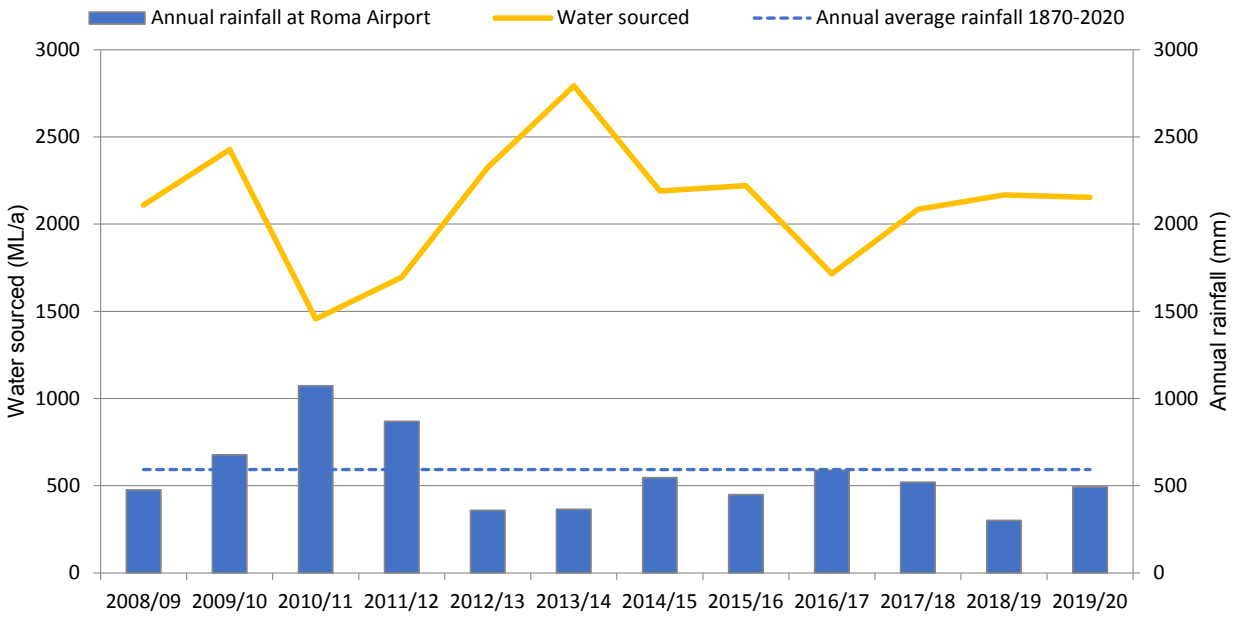

Figure 2: Water sourced and annual rainfall for Roma

Climate change

Climate change is a shift in the long-term average weather patterns or trends over many decades. The impacts are forecast to be different in different areas across Queensland. To better understand the possible impacts, regional scale projections based on global climate models have been developed by the Department of Environment and Science[1]. These models have been referenced against the climate change reference period 1986–2005. The projections are frequently reviewed as climate change knowledge evolves.

Long-term historical rainfall data for Roma (1870–2020) is summarised in Table 1 (page 6).

Annual rainfall for Roma over this period averaged 593 mm. Also shown in Table 1 is the average rainfall over the:

- 1986–2005 period — averaging similar to the longer term but as would be expected having a shorter band-with of extremes due to the shorter period of data
- 2008–09 to 2019–20 period which is a generally drier period in the historical record — also with a shorter band-with of extremes due to the shorter period of data, and
- eight drought years commencing in 2012–13 which is much drier than the average over the long term and the climate change reference period 1986 to 2005 and also experienced a narrow band-width of extremes as there were no wet years.

1 Climate change projections developed by the Queensland Government's Department of Environment and Science

Image courtesy of Peter Campbell

Table 1: Summary of annual rainfall statistics for Roma

Rainfall Station No: 43030 Roma Post Office (1870–1991) Rainfall Station No: 43091 Roma Airport (1992–2020)	Mean (mm)	Median (mm)	Historic low (mm)	Historic high (mm)
1870 to 2020	593	582	164	1532
1986 to 2005	582	616	366	873
2008–09 to 2019–20	561	506	301	1073
2012–13 to 2019–20	453	471	301	588

Under an unchanged greenhouse gas emission scenario, the projected climatic changes for the Maranoa Regional Council local government area indicate that by 2050 seasonal variations may include:

- warmer temperatures for each season (average, minimum, and maximum)
- higher evaporation rates for each season
- longer durations of droughts.

The possibility of more extreme and longer-duration droughts than have previously been recorded historically for Queensland highlights the need for long term water supply planning processes to be adopted, implemented, and regularly reviewed.

While the average annual rainfall during the period from 2008–09 to 2019–20 is comparable to the median 2050 projection (for average annual rainfall)—561 mm and 586 mm respectively—projected higher evaporation suggests that Roma's average water demands may be higher in the future (with likely increased outdoor water use). The 2012–13 to 2019–20 period would provide a good benchmark for water supply network planning and meeting future service delivery needs.

Water Restrictions

In an effort to reduce water consumption and to extend the duration of the available water supply during extended dry periods, Council has permanent conservation measures in place for Roma which restrict outdoor water use to three days each week and only between 4pm and 9am during September to March. This action tends to result in use of around 5.7 ML/day (or around 2100ML/a) on average.

Any updates on water restriction rules can be sighted on Council's website (www.maranoa.qld.gov.au).

Other users of the bulk water supply sources

Agriculture

The key agricultural industries in the Roma region are sheep and cattle production. Within a 25 km radius of Roma there are 404 bores accessing water from Great Artesian Basin aquifers with 309 of those bores largely providing water supply for stock watering and domestic use.

The estimated extractions for stock and domestic use in this area from the Mooga and Gubberamunda Sandstone aquifers, which are currently Roma's main water source aquifers, are 331 ML/a and 217 ML/a respectively. These extractions are relatively small when compared to Roma's average town water supply extraction of around 2100 ML/a.

Industry

The main industries within Roma's urban area are associated with businesses directly supplying to the CSG industry, agribusinesses, construction, transport, tourism, cypress sawmilling, metal fabrication and engineering. The water use by these businesses is accounted for within the total water demand figures for the network, generally under the category of 'non-residential' water use.

Surrounding Roma's urban area there is significant ongoing oil and gas development. This development is largely occurring to the north and east of Roma. The extractions for CSG production, together with some planned future extractions from the Walloon Coal Measures for additional CSG production, are not expected to impact the quantity of water available to Roma from the Gubberamunda Sandstone aquifer.

Historical performance of Roma's water supply

Although, there has been no recorded urban water supply shortfall in Roma due to insufficient available groundwater to date, there have been significant drawdowns in the main Gubberamunda Sandstone aquifer as a result of town water supply extraction and these drawdowns radiate out for a considerable distance from Roma. The long-term viability of the GAB supply locally, from all aquifers accessed, will need to be closely monitored, and the groundwater levels and the amount extracted carefully managed into the future.

Figure 3 provides information about the behaviour of Roma's groundwater supply since 1988. In the absence of detailed water level data for the Roma town bores, DRDMW monitoring bores, although distant from the town bores, provide some information to better understand the historical behaviour of the groundwater within the Mooga and Gubberamunda Sandstone aquifers.

As can be seen from Figure 3, the water levels have been declining over a number of years.

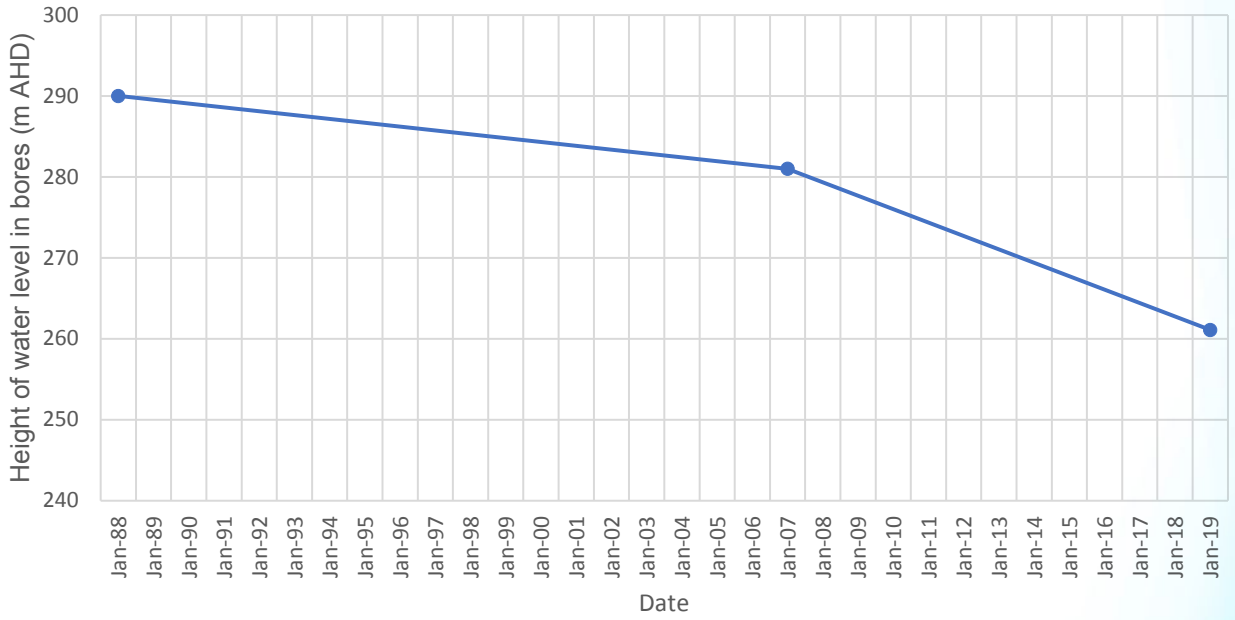

Figure 3: Recorded behaviour of Roma's groundwater supply from 1988 to 2019 based on groundwater levels at the time of drilling individual town water supply bores

Future water demand

Well-founded water supply planning necessitates an understanding of the likely (and possible) changes in water demand into the future.

The projections of population growth and water demand are 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).

Roma's town water demand

The resident population of Roma is projected to grow at the rate of 0.4% per annum in the period up to 2041 and is forecast to reach around 8000 by 2050.

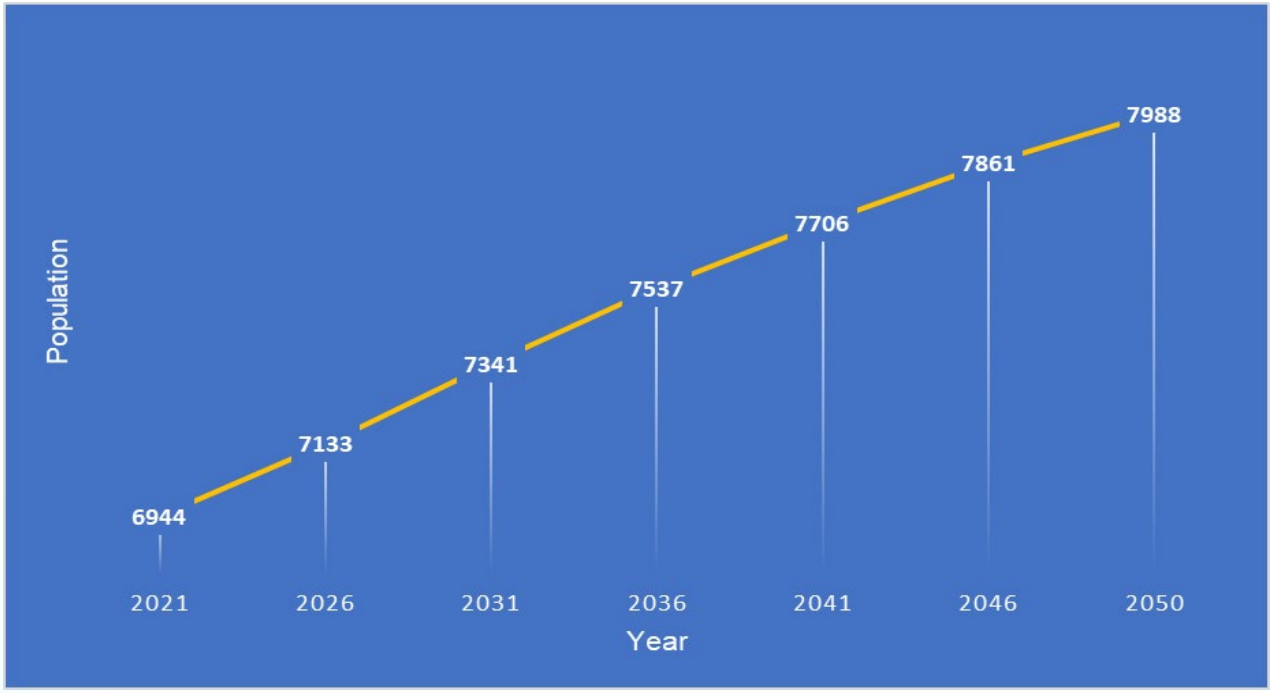

Figure 4: Roma's projected population growth

The average daily water demand for Roma over the 12-year period 2008–09 to 2019–20 was 817 L/c/d. This is a typical level of use for western Queensland cities and towns. As Roma's population is forecast to grow to the year 2050, proportional increases in average urban demand over this timeframe is also expected. However, during particularly dry periods, the demand is likely to be higher than this 'average' demand, and average demands may also be slightly higher in the future as a result of increased evaporation resulting in increased outdoor water use.

Under the assumption that per capita usage remains at an average of 817 L/c/d, the projected average annual volume sourced would increase to around 2400 ML/a by 2050.

Recycled water

As Roma's demand for potable water increases in the future, so too will the portion of water supplied through Roma's reticulation network that is collected and treated at Roma's wastewater treatment plant be available for recycling. However, based on the current use of recycled water in Roma for golf course and agricultural irrigation; and the continued availability of the groundwater for the town supply, it is considered unlikely that recycled water will be substituted for any town supply uses in Roma for the foreseeable future. Hence, for the purpose of this assessment, recycled water usage is excluded from consideration in Roma's future urban supply and demand balance.

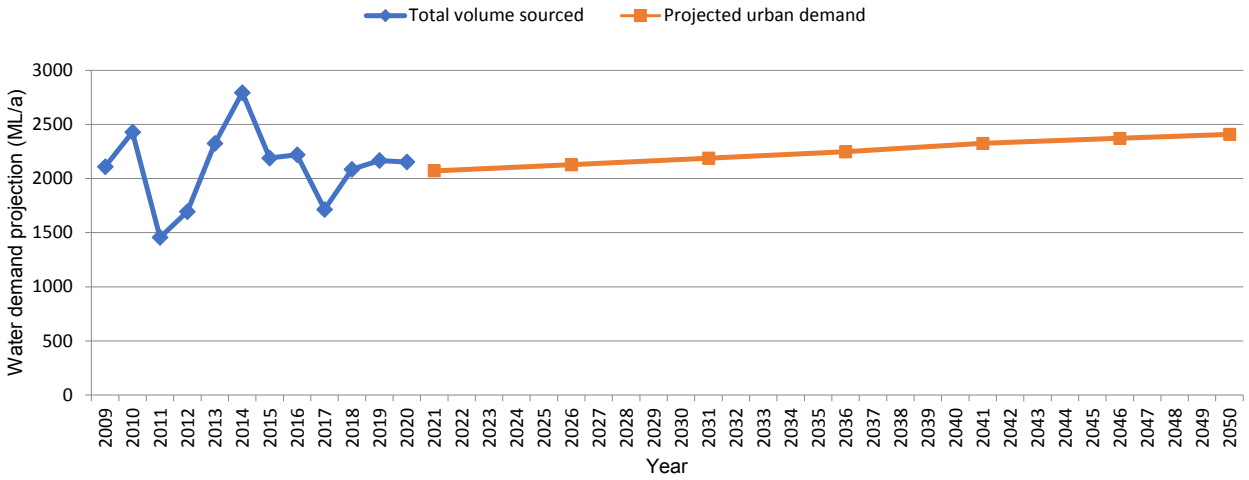

Figure 5: Average urban water demand projection for Roma

Other users of the bulk water supply sources

Agriculture

Additional groundwater demand for nearby agricultural (stock) purposes is currently not prohibited under the Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017, therefore any potential changes in water demand in the vicinity of Roma's town bores and the associated impacts on water levels will need to be monitored and assessed to ensure any additional extractions do not significantly impact the water levels in Roma's town water supply bores.

Industry and commerce

Future growth in industry and commerce, and associated water demands, is largely subject to changes in population and/or changes in the global economic environment resulting in increased demands for exported products from the region. At this stage, there are no definite large-scale industrial developments or changes anticipated that would significantly impact on water demand from the water supply sources used for Roma. Hence, this assessment assumes growth in water demand from industry and commerce in Roma is incorporated in the aforementioned overall per capita demand rate.

Water supply system capability

A hydrogeological review of the available groundwater information relevant to Roma's bore supply has been undertaken by DRDMW to assess the capability of Roma's water supply sources to meet current and projected future water demands (DRDMW, 2021, 'Roma Town Water Supply Hydrogeological Review'). The review included information from regional groundwater assessments undertaken by the Queensland Government to support its management of the CSG industry near Roma.

The hydrogeologic review found the groundwater levels in the Gubberamunda Sandstone aquifer are likely to continue to decline if the current rate of extraction is maintained even during years of average to above average rainfall. Local groundwater assessment and modelling is recommended as a decision support tool to assist in the management of water extractions particularly from the Gubberamunda Sandstone aquifer.

Decommissioning of older bores and exploring the deeper Hutton Sandstone aquifer for an increased percentage of the town's water supply is recommended, as is careful selection and management of when and for how long each bore is operated.

As there are currently no restrictions on drilling additional bores within 25 km of Roma for stock and domestic purposes, other landholders in the area could potentially drill new bores, placing additional demand on the aquifers currently accessed by Council.

Water level monitoring at each town bore, and down-hole inspections of selected bores, will aid in the process of managing extractions from individual aquifers as well as identifying bores that should be decommissioned or replaced and inform how the borefield would best be operated to provide for back-up capacity and minimise power consumption.

Photo: Roma Saleyards. Courtesy of Tourism and Events Queensland.

Moving forward

This UWSA has been a collaboration between the Queensland Government and Maranoa Regional Council to develop a shared understanding of the existing security of Roma's water supply and its capacity to support future growth.

Maranoa Regional Council recognises that a secure and reliable water supply is essential for supporting Roma's current and future population, as well as local businesses, industry and tourism. Council is committed to moving forward and achieving this outcome for the community.

Council will continue to proactively investigate, develop and implement solutions to ensure sustainable water supply security for the Roma community and to support additional growth, potentially including:

- Decommissioning, as recommended by DRDMW, the oldest town water supply bores in poor condition that were constructed up to over 120 years ago and replacing them with bores potentially connected to the Hutton Sandstone aquifer to provide secure water supply.
- Increasing reservoir capacity to guarantee a minimum of three days' supply from above ground storage by installing a 5 ML capacity reservoir with gravity feed to the whole town network and to provide a high-flow source to support new economic development.
- Replacing old reticulation mains that are starting to fracture in the northern and southern reticulation zones, to ensure the community and new and existing commercial and industrial enterprises benefit from reliable water supply delivery.
- Installing continuous data loggers on key town water supply bores over time, to enable monitoring and support a local model for assessment of groundwater extraction impacts; and provide telemetry connection to, and upgrading of, the existing SCADA system to enable optimum management of groundwater extractions to ensure water provision and minimised pumping power costs.
- Identifying any area where demand management can be slightly improved and potentially conduct a community education program including a WaterWise Home and Garden Rebate scheme and establish a water efficient demonstration garden and a sports field irrigated with surface water or conditioned groundwater to minimise groundwater demand.
- Conducting a meter validation/replacement program across Roma to ensure accuracy of metering.

Council acknowledges that it has an important role to play in educating the community regarding water conservation and ensuring that the available water resources are effectively managed. Council will work with the community to identify an appropriate level of service for water supply security in Roma, which will involve balancing an acceptable level of water availability with the lifestyle and expectations of the community.

By continuing to pursue an appropriate level of water supply security for Roma, Council is working to ensure that the right environment exists for the community, businesses, industry and tourism to thrive in Roma.

For more information on the Urban Water Security Assessment program please visit

business.qld.gov.au