Department of Regional Development, Manufacturing and Water

Water security statement

Guidance for template

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Queensland Government

This publication has been compiled by Urban Water Supply Planning, Department of Regional Development, Manufacturing and Water.

Interpreter statement:

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Interpreter

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OFFICIAL

Version history

Version	Date	Comments
1	10/12/2021	Initial release

Approval

Position	Name	Date
Director, Urban Water Supply Planning	Richard Priman	10/12/2021

Background

The urban water security assessment (UWSA) program[1] has been developed by the Queensland Government to help improve the understanding of how a community's water supply system operates and performs, including its water supply security risks, for council, government and the community.

The Queensland Government has partnered with relevant local governments to develop 24 assessments (as of March 2021) for major urban communities in Queensland. This partnership has resulted in greater awareness and understanding of urban water security in these areas and enabled local governments to identify and implement actions to provide an appropriate level of water security for their community.

Generally, Government will partner with councils to undertake an assessment for communities where the risks are higher such as for communities with more than 2000 residents. This water security statement (WSS) guide has been created to help local governments to develop their own assessments and understand the water security needs of their communities.

This understanding can:

1. for council—enable council to manage and operate assets and undertake water supply planning to appropriately manage water supply security risks
2. for the community—help educate and create a greater understanding of how their water demands are met and how their sources of supply perform, fostering greater ownership of the water supply. This is in turn can result in more efficient water use
3. for government—provide an understanding of possible water supply limitations within a community, providing a baseline upon which specialised advice can be provided.

How to use this guideline

This guideline outlines suggested topics to be covered in a WSS, providing guidance on factors to be considered, data sources and example text.

Listed below are the suggested main information 'categories' that will inform and underpin the overall assessment of water security for a community. It is suggested that the WSS should have an overall summary of:

- Water supply sources:
  - Usual supplies, their reliability, how they are operated
  - Contingency and emergency supplies
  - Recycled water and what demand it meets
  - Water quality issues
- Infrastructure:
  - Water treatment, storage and distribution and any associated constraints
- Population:
  - Residential historical population and future projections
  - Current and projected population of non-residential customers
- Water demand:
  - Historical demands
  - Demand management and water restrictions, including review of historical programs
  - Consider potential impacts of climate
- Future security:
  - Future demand projections

[1] Formerly known as the Regional Water Supply Security Assessment Program

- Typical conditions scenario
- Ongoing drought scenario
- Consider potential impacts of climate change

For each section, this guide provides the section's objective (*in blue italicised text*), and a suggestion of the content that should be included. This guide may also provide additional guidance for a section, including possible data sources (in blue text), as well as an example (provided in a grey box). This is illustrated below.

Section heading	**2.6 Water quality issues**
Section aim	*Provide an overview of any significant water quality incidents (i.e. that have impacted supply delivery) that have been reported in the last 5-10 years. This can provide information as to the source reliability.*
Suggested content	Provide details of what was the incident, when did it occur, what was the impact on supply (e.g. required boil water, restrictions, carting from alternate supply). Specify if none reported. Also provide any anecdotal information about potential water quality issues (e.g. reiterate commentary in the latest Drinking Water Quality Management Plan to provide details of potential water quality issues).
Possible data source	Data may be available from the Drinking Water Quality Management Plan and associated annual reports.
An example	Example text The water treatment plant has a substantially reduced capacity during dirty water events linked to high rainfall events. Over the last 10 years there have been boil water notices that were in place no longer than 1 month.

This guide has been developed as an iterative document that will be regularly updated based on feedback received from users of the document. Please provide feedback on the document, including additional information or guidance that might be useful, to UrbanWaterSupply@rdmw.qld.gov.au.

If you have any questions, please contact the Urban Water Supply Planning group on email UrbanWaterSupply@rdmw.qld.gov.au.

The Urban Water Supply Planning team would appreciate a copy of your completed assessment, so that we have a better understanding of your water supply system. This can help when we are validating report data, such as that reported under the key performance indicator (KPI) framework, and if you have any water supply security concerns in the future.

Information sources

The development of a WSS is supported by knowledge of the community and the water service. This information can be gained from a range of sources, which are provided in Table 1 overleaf. It is considered that, at a minimum, information about the following is required to prepare a well-informed WSS:

- at least 10 years of historical information about the water supply sources and associated infrastructure (including information on flow/levels)
- at least 10 years of data on water use (including the use of the main user groups within the community)
- analysis of longer term historical reliability of water supply sources
- consideration of the impact of any previous demand management activities
- informed projection of water demands
- consideration of the influence of weather on demand, and the potential for climate change to influence water supply security.

Level of service objectives

The information collated in the WSS should provide a greater understanding of current and future water supply risks and could help in the development of water supply security level of service (LOS) objectives for the community. The WSS and LOS objectives can both be used to underpin future water supply planning and to foster a long-term outlook for water supply security planning for communities. Guidelines to assist in the development of water supply security LOS objectives can be accessed from the water supply security area of the Business Queensland website.

Table 1: Potential information sources for a water security statement

Topic	Usual data sources used
Supply sources	• Council’s website and Council records • Council’s drinking water quality management plan and recycled water quality management plan • Council’s drought management plan • Water plan and associated documents • SunWater website <www.sunwater.com.au>
Water entitlements	• Queensland Government’s open data portal <www.data.qld.gov.au> • Business Queensland’s water entitlement viewer <www.business.qld.gov.au> • Register of Water Allocations, searchable at Land Information and Titles offices
Streamflow and groundwater elevation data	• Queensland Government’s water monitoring information portal <https://water-monitoring.information.qld.gov.au/> • Bureau of Meteorology rainfall and river height data, and National Groundwater Information System (including bore locations map) <www.bom.gov.au>
Population data (historical and projected)	• QGSO (Queensland Government Statisticians Office) <www.qgso.qld.gov.au> • Council population information and planning • Australian Bureau of Statistics (ABS) community profiles <www.abs.gov.au> • Queensland Globe < https://qldglobe.information.qld.gov.au>
Transient population	• Published government tourist statistics—e.g. DestinationQ <www.destq.com.au>; Tourism and Event Queensland <teq.queensland.com>,Tourism Research Australia <www.tra.gov.au> • State Tourism Satellite Accounts <www.business.qld.gov.au>
Water use (sourced and supplied)	• Annual water service provider key performance indicators available through SWIM (State-wide Water Information Management) database managed by qldwater <www.swim.qldwater.com.au/adt> • Previous consultant/Council reports • Water treatment plant or source pumping records • Council billing data • Sunwater annual reports <www.sunwater.com.au>
Weather and climate data (historical and projected)	• Bureau of Meteorology • Queensland Government’s climate change science resources, including the Queensland future climate dashboard and the climate change in Queensland map application <www.qld.gov.au> • Long Paddock drought declarations <www.longpaddock.qld.gov.au> • The Australian Government’s climate change in Australia resources, including the climate futures tool and the regional climate change explorer <www.climatechangeinaustralia.gov.au>
Drought response measures (contingency and emergency supplies, restrictions)	• Council drinking water quality management plan • Council drought management plan

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1 Introduction

1.1 Scope

Provide an overview of the assessment process, including the water services considered and the communities serviced.

Provide the reason why this assessment was prepared (e.g. is it just for council, or to help inform the community also).

Example text

This is the water supply security assessment for Waterville as of September 2021.

This statement has been prepared to assist council and the community to:

- understand the current water supply security status of the community
- understand the capacity of the water supply system to support future population and economic growth.

This assessment will assist council to develop appropriate short, medium and long term plans to achieve and maintain adequate water security for the community.

Provide details of the scope of the assessment:

- The name of the water service/s
- The type/s of water—drinking water / non-drinking water / raw water / partially treated (non-drinking) / recycled water
- List all communities serviced, i.e. connected to the same supply or reliant on it, for example by carting water.

Provide details of what was considered in the assessment, for example:

- Available surface and groundwater supplies, imported water [specify the water service provider and the supply source for the imported water]
- Recycled water produced at sewage treatment plant/s [specify treatment plant/s]
- Population growth aligned with past growth / projections from QGSO
- Average residential demand and average total urban demand for at least the last 10 years where possible (in some cases this will be limited by availability of data)
- Current infrastructure capacity and limitations
- Current climate change predictions for the region.

An Excel workbook is available from the Urban Water Supply Planning team to assist in the compilation and analysis of data. Please email the team for a copy: UrbanWaterSupply@rdmw.qld.gov.au.

1.2 Community overview

Provide an overview of the community, including the type of water supply and its key industry.

Provide key information to create context for the statement, including (but not limited to):

- a brief description of the community serviced and the approximate date of when reticulated services commenced
- key industry (e.g. any key industry/s that use the water supply source/s, including any large agriculture water users, be clear if part of network or their own entitlement)
- surrounding land use e.g. rural residential, irrigated agriculture (e.g. sugarcane, cotton), beef and dairy cattle, other stock etc.

Include a map with relevant information such as community's serviced area, nearby locations, landmarks, water sources, water infrastructure (dams, weirs, creeks, rivers, treatment plants, bores reservoir, etc.).

Example text

The town of Waterville is located in the Someplace Regional Council area, approximately 18 km south-east of Aquaville. Waterville is a rural-residential community surrounded by agricultural properties that farm a wide range of crops, dairy and beef cattle and other stock. Someplace Regional Council provides reticulated water supply to Waterville. Drinking water is provided to connected properties through a pressurised on-demand service, fed by disinfected bore water. These services have been provided since 2011-12.

1.3 Water planning

Provide information on any existing water security plans, drought management plans, level of service objectives or other objectives and targets for the water supply system for the community.

This can be done as a separate section or integrated with Section 1.1 or 1.2.

This water security statement should be read in conjunction with council's other planning documents such as the:

- a water strategy that sets out the restrictions schedule and level of service objectives for water supply
- drought management plan
- emergency response plan
- capital works program.

2 Water supply sources

Describe the water supply sources that provide water for the community. This information contributes to understanding the resilience of the system (knowing the various types of supply, the supply source behaviour and potential supply constraints) and the potential total supply that can be provided.

2.1 Usual sources

Provide a description of the water sources (e.g. catchment or aquifer, infrastructure, reference relevant entitlements and regulations that impact the take of water).

Table 2 below provides basic description of various supply sources, which can be used as a template to individually list each water supply, name, storage or supply details and relevant infrastructure, note any relevant operational rules, including on significant other users of the supply source such as large industry.

Data may be available from:

- council drinking water quality management plans and recycled water management plans
- the Queensland Government's open data portal <www.data.qld.gov.au>—for water licensing and permit information for surface water and groundwater
- the water entitlement viewer (accessed through <www.business.qld.gov.au>)—for details on water management areas, available water types and volume
- paid searches of the Register of Water Allocations, in person at Land Information and Titles Offices <www.business.qld.gov.au>—for details of allocations
- the National Groundwater Information System <www.bom.gov.au>—the bore locations map
- the Queensland Globe < https://qldglobe.information.qld.gov.au/>—bore location information
- bore reports, accessed by searching for 'bore reports' in <www.business.qld.gov.au> and then entering a bore registration number)
- Sunwater <www.sunwater.com.au>—for details on current surface water volumes in water supply schemes.

Table 2: Water supply sources summary

Source	Details	
XXX Dam/weir	Location	Close landmark / x km from [town] Latitude and longitude coordinates (*optional*)
	Watercourse	[water course] (AMTD)
	Catchment	Name
	Water Plan	Part of the [name] water supply scheme
	Owner	Who owns and operates the infrastructure
	Capacity	X ML
	Minimum operating level	X m
	Entitlement	Type, annual volume, priority group, uses e.g. tradable allocation / licence, High A, urban water supply

Source	Details	
	Entitlement conditions	Any conditions that potentially limit the take of water under the entitlement e.g. Maximum extraction rate, announced allocations, cut-off rules
	Water quality issues	Any water quality issues/none e.g. high turbidity, TDS, colour
	Significant other users of source	Other users of the supply source e.g. [community Y], local irrigated agriculture
River extraction	Location	Close landmark / x km from [town] Latitude and longitude coordinates (*optional*)
	Watercourse	[water source] (AMTD (*optional*))
	Water Plan	Part of the [name] water supply scheme
	Entitlement	Annual volume, priority group, uses e.g. tradable allocation / licence, High A, urban water supply
	Entitlement conditions	Any conditions that potentially limit the take of water under the entitlement e.g. Maximum extraction rate, announced allocations, cut-off rules
	Water quality issues	Any water quality issues/none e.g. high turbidity, TDS, colour
	Significant other users of source	Other users of the supply source e.g. [community Y], local irrigated agriculture
XX off-stream storage for water harvesting scheme	Location	Close landmark / x km from [town]
	Water source	[watercourse] (AMTD of extraction point (*optional*))
	Capacity	X ML
	Entitlement	Type, annual volume, priority group, uses e.g. tradable allocation / licence, High A, Any purpose
	Entitlement conditions	Any conditions associated with water harvesting e.g. Maximum extraction rate, monitoring bore
YYY Bore/s	Location	Street address Latitude and longitude coordinates (*optional*)
	Aquifer	Aquifer name e.g. Speck Basalts
	Entitlement	Type, annual volume, priority group, uses e.g. tradable allocation / licence, High A, urban water supply
	Entitlement conditions	Any conditions that potentially limit the take of water under the entitlement e.g. Maximum extraction rate, use of monitoring bore
	Sustainability / safe yield / vulnerability[2]	Comments on sustainability of the aquifer, include the safe yield of the bore and its vulnerability. e.g. From local knowledge it is known that the bores have a reduced operating performance during drought conditions. The safe yield of the bores is [unknown/x L/s].

[2] Groundwater vulnerability is a measure of how easy or how hard it is for pollution or contamination at the land surface to reach a production aquifer.

Source	Details	
		Groundwater vulnerability is Low / Moderate / High
	Water quality issues	Any water quality issues/none e.g. high turbidity, TDS, colour
	Significant other users of source	Other users of the aquifer e.g. [community Y], local irrigated agriculture
Marine water desalination plant	Location	Street address Latitude and longitude coordinates (*optional*)
	Intake location	Latitude and longitude coordinates (*optional*)
	Capacity	X ML/d
	Constraints	e.g. discharge limits
Third party recycled water source e.g. CSG	Extraction location	Point of take for the recycled water e.g. water is extracted from [weir] / supplied to intake at [water treatment plant]
	Type of water	Class of recycled water provided e.g. Recycled water class A
	Volume	Up to X ML per day
	Conditions	Any conditions associated with the supply or demand of recycled water e.g. maximum supply rate kL/d
Recycled sewage water	Water source	Xxx sewage treatment plant
	Treatment capacity	X ML/d
	Quality	Class x water, suitable for y purpose
	Applications	Uses of recycled sewage water e.g. irrigation of local parks and garden, supplied to local irrigated agriculture

2.2 Operating philosophy

Provide details of how the supply is typically operated (i.e. if there is a preferential supply, linkages to other water services etc.).

Outline the operating philosophy and rules for the selection and utilisation of the various water sources, for example is there a preferential supply source (include overview of reason), what triggers changes in source, is water extracted continuously or only during the day or according to levels in storage etc.

Comment on linkages to any other water services and sources, for example is water imported or exported to other services, the volumes and quality of water involved (including raw water, treated drinking water, non-drinking water, recycled water), if relevant—specifically note how recycled is water used in the community, including notes on whether it replaces/reduces the use of reticulated water.

Data may be available from the Council drinking water quality management plans, recycled water management plans and from the operations team.

2.3 Contingency supplies

Provide details of any contingency (i.e. back up) water supplies, whether it is available, planned, or to be investigated further.

A contingency water supply is a planned response to increase the likelihood that the expected demands will be met when ‘usual’ supplies are compromised (for example during drought or during infrastructure breakdown). The contingency supply augments the urban water supply, either temporarily or permanently.

Examples include new bore, temporary desalination plant, accessing local waterhole, short-haul / low volume water carting.

Provide details of contingency supply, whether it is available, planned or to be investigated further. Use Table 3 as a template, selecting relevant types of source/s.

Refer to the most recent drought management plan.

2.4 Emergency supplies

Provide details of any emergency water supplies to ensure continuity of water supply, whether it is available, planned or to be investigated further.

An emergency water supply is a planned response that is temporary and is required to provide sufficient supply to meet highly restricted demand. It is implemented when there is a high likelihood that ‘usual’ supplies will be unable to meet expected demands or when there are inadequate supplies to meet demands.

Examples include long distance / high volume carting water, low quality feed water sources (e.g. local waterhole) with high treatment costs, temporary desalination plant. Emergency supplies typically require significant expenditure of resources.

Include details in Table 3 with contingency supplies, if known. Refer to the most recent drought management plan.

Table 3: Water supply sources summary--contingency and emergency sources

Source	Details	
Water carting	Location	Standpipe - x km from [town] at …. Latitude and longitude coordinates (*optional*)
	Water source	Source and level of treatment of water e.g. raw water from Speck Dam; treated water from Spick Council’s main water treatment plant
	Entitlement	Annual volume, priority group, uses, conditions (if relevant)
	Significant other users of source	[community Y] regional irrigated agriculture
Bore/s	Location	Street address Latitude and longitude coordinates
	Aquifer	Aquifer name e.g. Speck Basalts
	Entitlement	Annual volume, priority group, uses e.g. tradable allocation / licence, High A, Town water supply

Source	Details	
	Entitlement conditions	Any conditions that potentially limit the take of water under the entitlement e.g. maximum extraction rate
	Sustainability / safe yield / vulnerability[3]	Comments on sustainability of the aquifer, include the safe yield of the bore and its vulnerability. e.g. From local knowledge it is known that the bores have a reduced operating performance during drought conditions. The safe yield of the bores is [unknown/x L/s]. Groundwater vulnerability is Low / Moderate / High
	Water quality issues	Any water quality issues/none e.g. high turbidity, TDS, colour
	Significant other users of source	Other users of the aquifer e.g. [community Y], local irrigated agriculture
Portable desalination plant	Location	Street address Latitude and longitude coordinates (*optional*)
	Intake location	Latitude and longitude coordinates (*optional*)
	Source water intake	Details
	Capacity	X ML/d
	Constraints	e.g. discharge limits

2.5 Historical reliability of water supply sources

Provide details of historical storage and supply performance (using historical records of relative changes in volume/flows, capacity to provide supply to communities, etc.). This information contributes to the understanding of the historical behaviour of the system and the potential supply reliability that can be provided to the community.

Information captured in this section will vary depending on the type of water supply sources (e.g. weir/dam, bore, river and other).

Generally, include information such as:

- historical water levels (in dam/weir, bore, river intake, etc.)—graph
- historical stream flows if possible—graph
- announced allocations history—table or graph
- yield assessment results (if available)
- local knowledge of the system.

In looking at historical reliability, provide information and analysis of:

- any historical failure or near failure events (giving consideration to when these occurred, preceding conditions) based on stream flows/water levels or bore levels as appropriate.
- whether there is any seasonal or regular pattern of low water availability or conditions that impact the take of water.

[3] Groundwater vulnerability is a measure of how easy or how hard it is for pollution or contamination at the land surface to reach a production aquifer.

Information can be found at:

- the water monitoring information portal—for streamflow data, including height and flow data and daily flow duration; and bore monitoring data (accessed through <https://water-monitoring.information.qld.gov.au/>). Data will ideally be available from a monitoring station at or near the water source. In cases where the monitoring station is some distance from the point of take, the similarity of conditions could be verified against other information sources (e.g. decommissioned monitoring stations), or this data could be used as ancillary rather than primary information.
- Council's bore height records, other data and local knowledge
- Sunwater annual reports—for entitlement and demand data by water supply scheme and sector. Annual ROP reports provide data on carryover and forward draw. Announced allocations histories are also readily available for each scheme.
- The Queensland Globe <https://qldglobe.information.qld.gov.au>—for bore locations
- BOM water data <www.bom.gov.au>—for historical water storage and streamflow information
- council gauging station and SCADA data used to monitor water levels.

The following examples provide an overview of a very basic assessment of historical reliability. Additional information and analysis would be required if there was a significant storage as part of the water supply. Additionally, some communities may require bore tests in order to better understand groundwater reliability.

Example text: Simple assessment of historical reliability based on surface water levels and flows

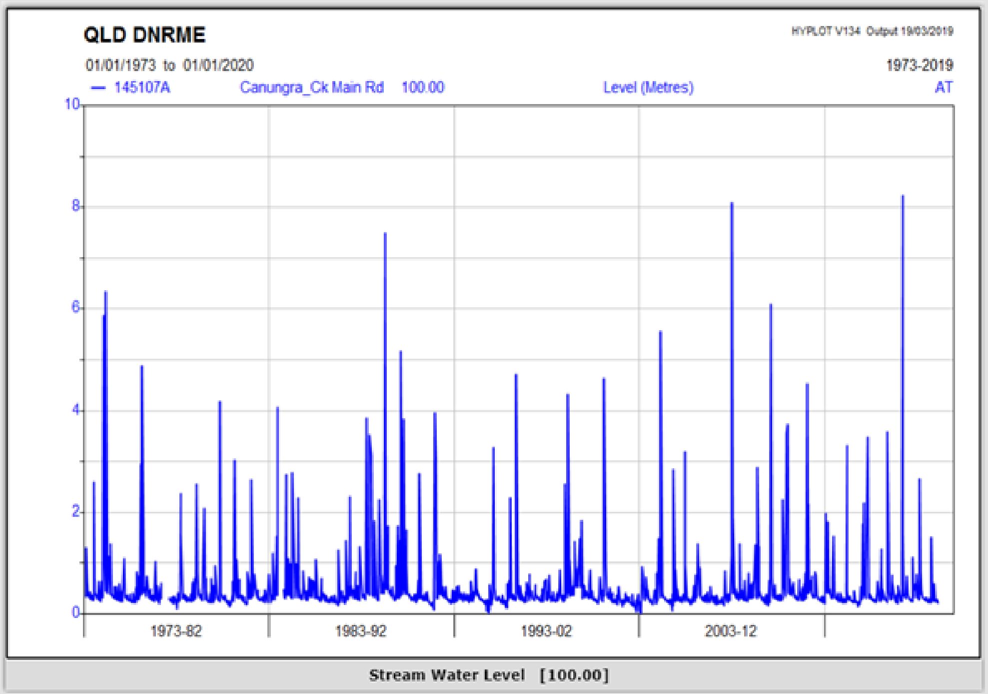

Figure 1: Historical stream level

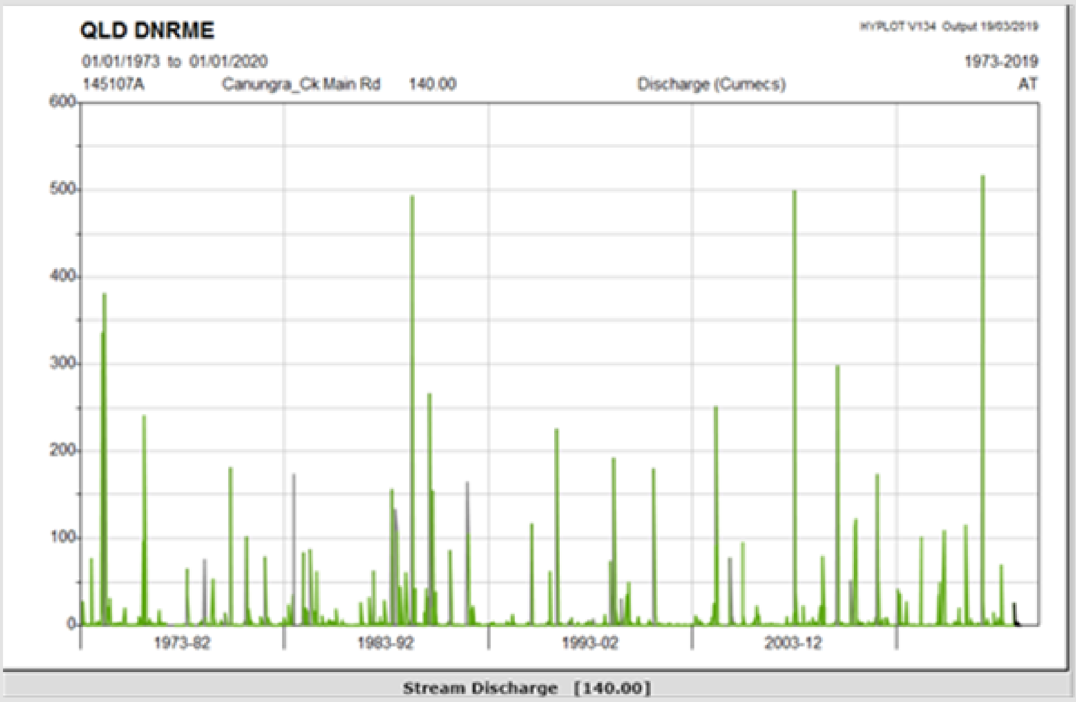

Figure 2: Historical stream flow

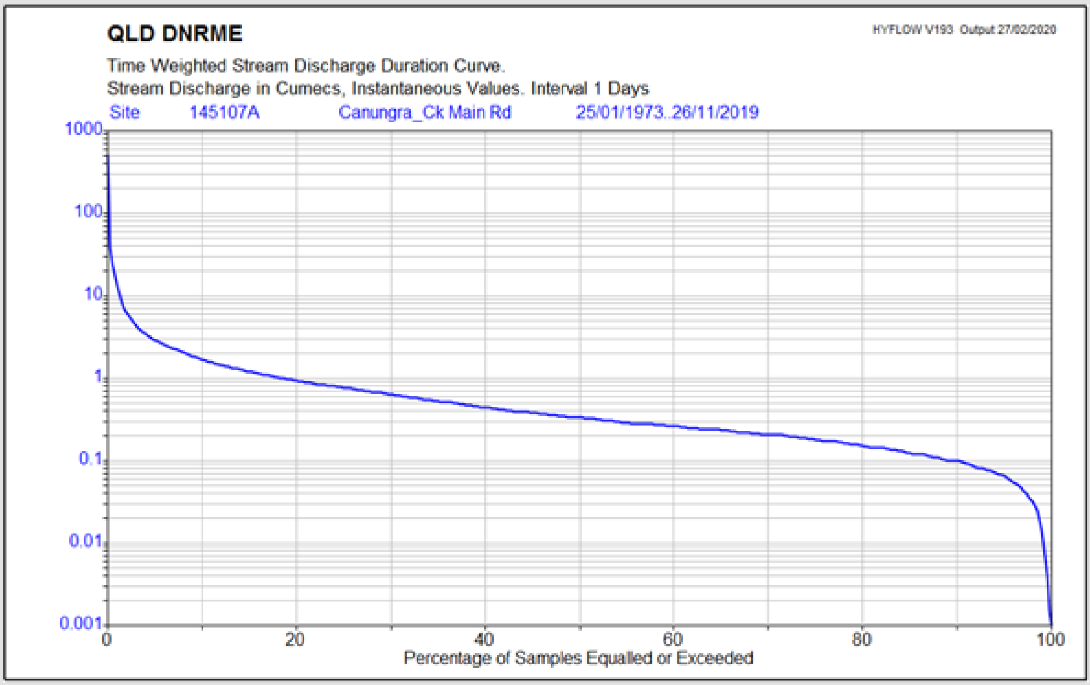

Figure 3: Flow exceedance curve (daily flow duration)

Source: <https://water-monitoring.information.qld.gov.au>

The figures above showing stream height and flow indicate that the source that primarily supplies Waterville has generally maintained sufficient flows to meet the town's demands, with frequent high flow events. Records from the past 15 years show that the supply has been sufficiently low that Waterville has had to cart on only one occasion for a period of two months. Based on these historical flows, it is expected that the supply can generally provide up to 0.8 ML/d (based on a reasonably reliable flow of 10 m^3/s).

Example text: Simple assessment of historical reliability based on groundwater heights and elevations

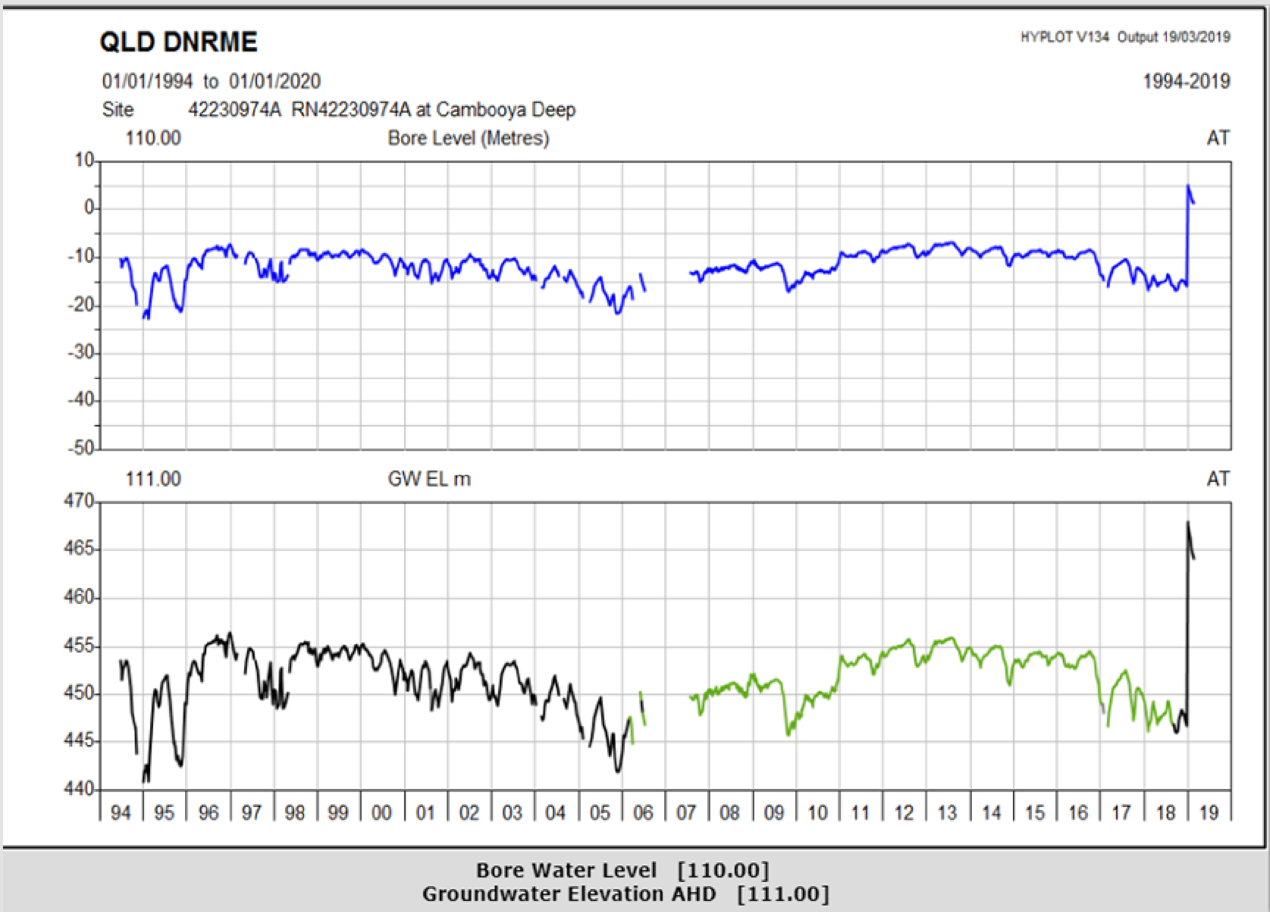

Figure 4: Historical heights and elevation

Source: <https://water-monitoring.information.qld.gov.au>

The above bore water level graph indicates that the bore levels have generally been maintained above their minimum operating depth. There have been no recorded instances of any bore failure since 2006 (and it is assumed no failure since its construction in 1990). It is noted that during periods of water restrictions in the council area (1998-99 and 2011-13) groundwater tended to be maintained at higher levels. This indicates that appropriate demand management could enhance reliability for town water supplies.

Example text: Simple assessment based on historical knowledge

The town water supply is from the bed sands of the Blue River. There are two recorded occasions over the past thirty years where excavation of the bed sands was required to maintain adequate water supply. Based on this information, it is considered that the alluvial groundwater is reliable, for the volume historically taken.

Example text: Historical reliability based on announced allocation of water allocation

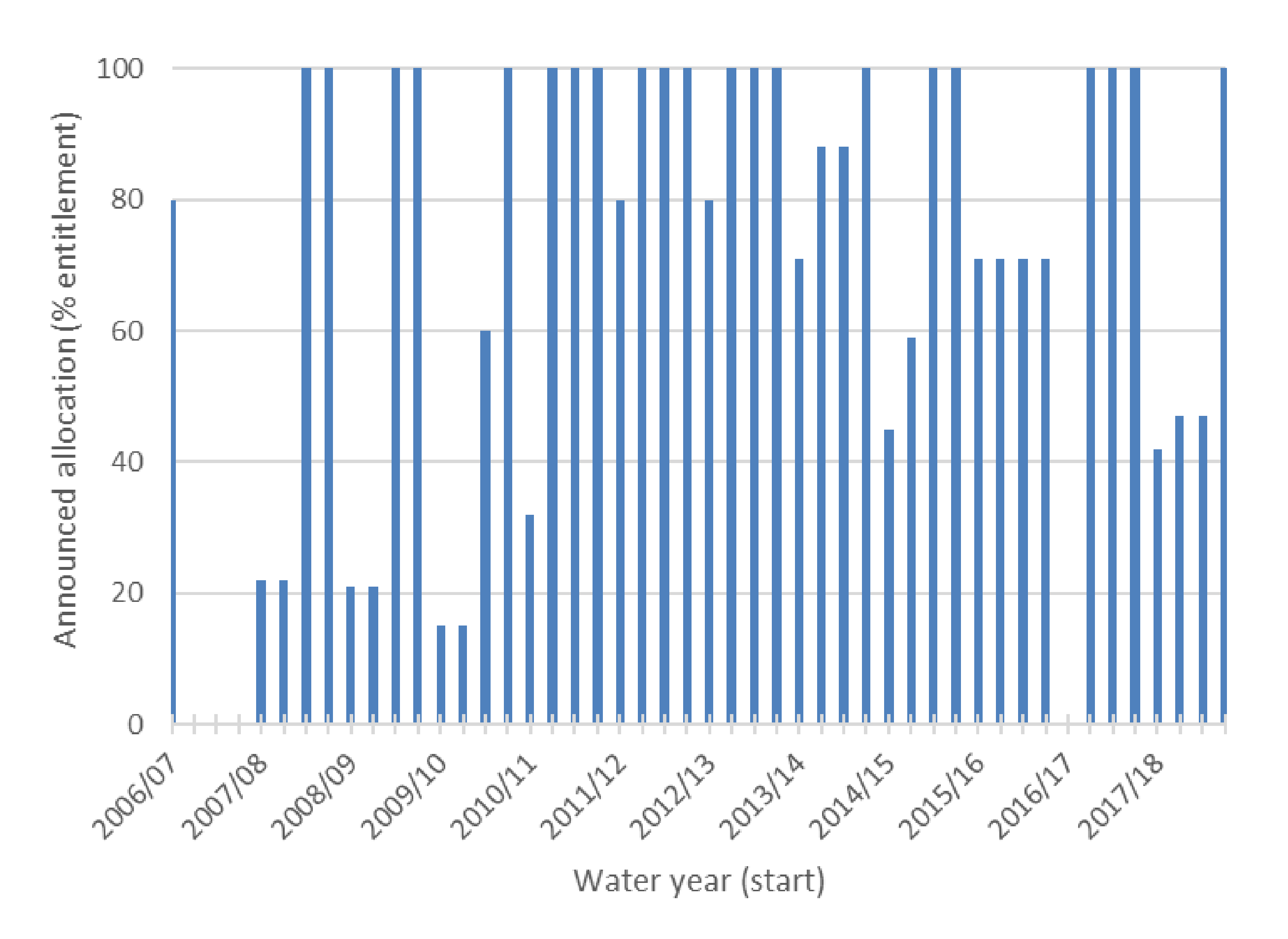

Figure 5: Historical announced allocation of High B priority water allocation

Source: Sunwater / resource operations licence holder scheme statistics

The graph above shows the historical announced allocation of High B priority water allocations, of which council holds 850 ML/a for water supplies for Waterville. The graph indicates that announced allocations have been reduced to low levels over six water years over the past 12 years. While contingency supplies were only required on two occasions (when it was below 20% announced allocation) it does indicate that the supply does reach low levels relatively frequently. Particularly given the assumption that only half of the water allocations for agriculture are currently utilised, and urban demands are only half of the available entitlement, this indicates potential reliability risk.

2.6 Water quality issues

Provide an overview of any significant water quality incidents (i.e. that have impacted on supply delivery) that have been reported in the last 5-10 years. This can provide information of the source reliability.

Provide details of what was the incident, when did it occur, what was the impact on supply (e.g. required boil water, restrictions, carting from alternate supply). Specify if none reported.

Also provide any anecdotal information about potential water quality issues (e.g. reiterate commentary in the Drinking Water Quality Management Plan 2015 that states water quality is potentially an issue when XX Dam is at or below 500 ML).

Data may be available from the Drinking Water Quality Management Plan and associated annual reports.

Example text

The water treatment plant has a substantially reduced capacity during dirty water events linked to high rainfall events. Over the last 10 years there have been three boil water notices that were in place no longer than 1 month as a result of water treatment plant issues.

2.7 Recycled water

Provide information about existing recycled water services and the potential for new or expanded recycled water services that may offset demand on other sources.

Provide details of any recycled water services operating in the community water service area. Specify if recycled water offsets demand for reticulated water (i.e. whether recycled water is a reliable supply provided in addition to reticulated water supply and will be assumed as separate and additional to the urban water demand, OR if recycled water offsets demand that would be placed on the network if it was not available and which could increase/decrease in future). Include basic information on effluent sources, treatment and storage capacity, associated reticulation networks, product water quality (purpose or use it is fit for) and current usage arrangements. Include a summary with other sources at the end of Table 2.

Include information on potential for recycled water, based on volumes of sewage produced by the community. Include brief details of the number of sewage treatment plants, average annual volume of effluent treated in each WTP and volumes potentially available to new or expanded recycled water services.

Data is available from SWIM <www.swim.qldwater.com.au/adt> and in-house.

2.8 Other users of the bulk water supply source

Provide information on other significant uses of the same bulk water supply sources. It can be useful to understand if there are other users that could potentially impact access to water sources in the future. For example, if these other users increase utilisation of existing entitlements such that the supply is drawn down more rapidly and/or frequently and a cut-off is reached earlier.

Note other significant water users that source water from the same bulk water supply sources; if possible, note the volume and priority (if applicable) of the entitlements and their sector of use (such as urban, irrigation, industry etc.). Indicate if there are no other entitlement holders or if the information is not known.

Specify any relevant likely proposed development in the region (industry, urban, agriculture, etc.) that could impact on water supply availability in the future, how it might impact and when it is expected to occur.

Data is available from:

- Water licensing and permit information for surface water and groundwater is available from the Queensland Government's open data portal (<https://data.qld.gov.au>) or the water entitlement viewer (accessed through <www.business.qld.gov.au>)
- Sunwater Annual Statistics and Network Service Plans for water supply schemes allocations (accessed at <www.sunwater.com.au>)
- Details of allocations are currently only available through paid searches of the Register of Water Allocations, in person at Land Information and Titles Offices (more information at <www.business.qld.gov.au>).

3 Water infrastructure

3.1 Source, treatment and distribution

Provide an overview of the source, treatment and distribution network. The limitations on infrastructure capacity can directly impact on the ability to deliver water to customers. Understanding the extent of the reticulation network is also critical to understanding the size of the serviced population, and forms the basis of population and water demand projections.

For each type of water service (drinking water, non-drinking water, recycled water) operating within the community:

- Provide a summary of the infrastructure used to take water (include the capacity of any pumps or pipes), the water treatment (include type of treatment and water treatment plant capacity, number and capacity of treated water reservoirs), and if relevant information on any associated infrastructure such as re-chlorination stations and header tanks.
- Briefly outline any major water supply infrastructure augmentation that has occurred in the last 10 years, the nature, scale, and when it occurred.
- Describe any existing or potential capacity constraints (i.e. 'bottlenecks') for treatment, storage and/or distribution of water for each service operated in the community (consider capacity of pumps, tanks, pipes etc.).
- A map of the reticulation network for each water supply service operating in the community (drinking water, recycled water, raw water etc.)—this can be useful in determining the connected population based on QGSO.

Use a table to summarise key aspects (see Table 2). If possible, a schematic providing an overview of the system could be useful.

3.2 Water infrastructure historical issues

Provide an overview of any significant issues relating to treatment, storage and distribution that have impacted on supply delivery in the last 5-10 years. This can give an indication of key infrastructure capacity constraints.

Provide details of any water infrastructure incidents that have impacted the supply of water over the last 10 years, when it occurred, what was the impact on supply (e.g. boil water alerts, restrictions, carting from alternate supply). Specify if none known.

Use local knowledge from water planners and operators, and the general community.

3.3 Water infrastructure historical issues

Provide an overview of any significant issues relating to treatment, storage and distribution that have impacted on supply delivery in the last 5-10 years. This can give an indication of key infrastructure capacity constraints.

Provide details of any water infrastructure incidents that have impacted the supply of water over the last 10 years, when it occurred, what was the impact on supply (e.g. boil water alerts, restrictions, carting from alternate supply). Specify if none known.

Use local knowledge from water planners and operators, and the general community.

3.4 Asset management

Provide an overview of any infrastructure maintenance or asset management activities that regularly occur, including any planned infrastructure augmentation or replacement. This can provide an indication of service reliability and potential water losses.

Provide an overview of:

- relevant infrastructure maintenance (i.e. known issues with maintenance / no known issues) and its impact on service reliability
- any asset management activities, e.g. leak detection programs, rehabilitation/refurbishment/replacement of aging reticulation mains, asset management planning review at least every ten years
- any significant losses and where these losses might be occurring.

4 Population

Describe historical population growth and potential future population growth, including a range of growth scenarios. Consideration should be given to residential and non-residential growth and projections for regional economic growth. The information gathered will support prediction of future water demands in the community.

Provide an overview of the historical and current population residing within the community area, particularly focussing on the resident population serviced by the reticulation network.

To estimate the population, it is recommended to use data provided by the Queensland Government Statistician's Office (QGSO). QGSO statistics are based on Australian Bureau of Statistics (ABS) census data (collected every five years) which is then updated quarterly using births, deaths and overseas and interstate migration data.

It is critical to first identify the most appropriate statistical area to use (i.e. the statistical area best aligned with network service area). A statistical area level 2 (SA2) is a medium sized area. They are generally between 3,000 – 25,000 people and represent a community made up of multiple SA1 areas. A statistical area level 1 (SA1) has a finer scale than SA2, generally between 200-800 people. SA1 can represent whole small urban communities, localities or suburbs. Urban Centres and Localities (UCLs) are made up of multiple SA1 areas, and represent urban localities. Mesh blocks are the finest scale of data available, with a dwelling count of 30-60.

Maps for statistical areas can be accessed from a range of sources[4] including:

- The Queensland Globe (accessed by visiting <https://qldglobe.information.qld.gov.au/>, and then clicking 'Layers', selecting 'Boundaries', and then selecting 'Australian census data,' the zooming into the locality, as shown in Figure 6).
  Take note of the statistical area name, and the associated 7 or 10 digit statistical area code (this information is accessed by clicking on the icon 'identify' and then selecting the desired locality (e.g. SA1, meshblock)—this helps to access and interpret population data from ABS and QGSO
- ABS Maps (accessed through <https://dbr.abs.gov.au/absmaps/index.html>, or through an internet search for 'ABS maps'). Use the dropdown options of ASGS 2016 and select the boundary type, to view the current statistical areas for either SA1 or SA2. Maps are available for current as well as historical statistical areas
- QGSO's maps for statistical areas (accessed by visiting <www.qgso.qld.gov.au> and searching for 'statistical area map')

[4] From the ABS - Statistical Areas Level 1 (SA1) are geographical areas built from whole Mesh Blocks. Whole SA1s aggregate to form Statistical Areas Level 2 (SA2). The SA1s have generally been designed as the smallest unit for the release of census data; however, limited census data may also be available at the Mesh Block level.

From the QGSO - The smallest geographic level for which the estimated resident population (ERP) is officially prepared and validated is the statistical area level 2 (SA2). ERP by statistical area level 1 (SA1) is then prepared by breaking down the SA2 ERP based on SA1–level census counts (for census year ERP) and other indicators (for non-census years). QGSO has derived synthetic ERP for Mesh block 2016 by apportioning SA1 2016 ERP to meshblock using the mesh block usual resident counts from Census 2016.

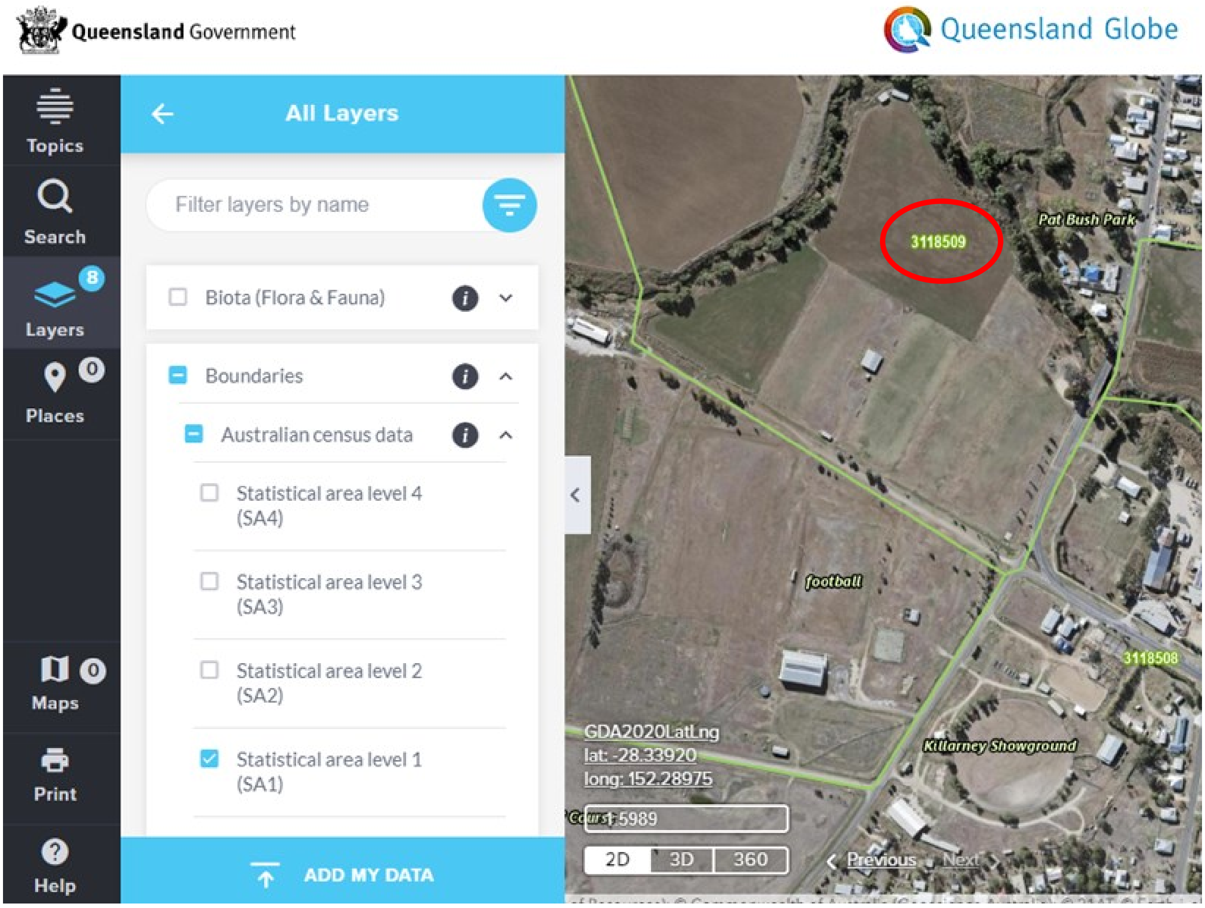

Figure 6: Searching for statistical areas in Queensland Globe

Use the maps listed above to identify which statistical area best resembles the service area, and take note of the statistical area name and the associated 7 or 10 digit code. It is suggested to use Queensland Globe to provide a better understanding of the service area by viewing the buildings and infrastructure. Often statistical area population reporting units do not neatly correspond with the area serviced by the reticulation network, or to the ‘serviced population’ (i.e. reflecting that not every household within the statistical area is serviced by the reticulated supply). Therefore a percentage of the population in the statistical area (SA2, SA1 or meshblock) may be determined to represent the actual serviced population. This could be estimated based on comparing the map of the statistical area to the reticulation network area.

Population data can be accessed by:

- searching for ‘estimated resident population’ on <www.qgso.qld.gov.au> and then selecting the ‘estimated resident population (ERP) (table)’, which has data for local government, SA2, SA1, and urban centre locality (UCL) statistical areas. SA1 data for 2001 to 2020 can also be found by searching for ‘SA1 correspondence file’ on <www.qgso.qld.gov.au>. Information about population projections until 2040 at SA2 and SA3 levels can be found by searching for “population projections – regions” on <www.qgso.qld.gov.au>.
- searching for ‘meshblock correspondence file’ (for meshblock data) on www.qgso.qld.gov.au. Meshblock data is generally limited to census year data. To receive a copy of population data at a meshblock level, please contact Urban Water Supply planning on urbanwatersupply@rdmw.qld.gov.au.

4.1 Historical population serviced by the reticulation network

Collate historical population data for the serviced community. This will provide a basis for estimating past population growth, and past water demand (per person).

Provide an overview of the estimated population connected to the reticulation network (i.e. the statistical areas that represent the reticulation network area) and the average annual historical growth. Also note if there have been any significant impacts on the population over this time (e.g. new residential development, close of a major industry). Tabulate estimated resident population back 20 years, or as far back as provided by QGSO, for the statistical area/s selected.

For many localities, population data might only go back to 2011, which is when the ABS adopted a new framework of statistical areas, referred to as the Australian Statistical Geography Standard (ASGS). You can check ABS Maps <https://dbr.abs.gov.au/absmaps/index.html> to see if the statistical areas used before 2011 align with the current best-fit statistical areas, allowing a longer time series of data to be used. Select an ASGS boundary type, such as 2016 SA2 or SA1, against the dropdown option of an ASGC boundary type to view previous statistical boundaries).

An alternative method to provide a coarse estimate is to multiply the number of connections by the estimated people per household.

Tabulate data (Table 4) and provide graphically (for an example, see page 22).

Table 4: Historical population

As at June 30	Estimated resident population (QGSO)		
	SA1 – community a	**SA1 – community b**	**Total**
20XX			
20XX			
20XX			

Source: QGSO

4.2 Future population growth scenarios

Provide the expected annual percentage increase (or decrease) in population for the community. There may be multiple growth scenarios from different information sources (e.g. population growth based on QGSO population growth projection; population growth based on a SA2 population projection and based on data at a SA1 level; population growth based on council projection). Where different information sources infer different future population scenarios, consider using a number of growth scenarios.

Data can be found in the 'statistics' section of <www.qgso.qld.gov.au>, under 'population projections'.

Provide an overview of:

1. growth trends provided by QGSO, particularly noting if high population growth is expected.

   QGSO's regional profiles estimate the resident population growth until 2036 at the SA2 level (<https://statistics.qgso.qld.gov.au/qld-regional-profiles>). You will need to consider whether or not the community is likely to experience the general trend of population growth of its SA2. If not, an alternative population projection can be made by identifying and applying the historical population growth rate.
2. relevant information from local knowledge of the area of the community
3. relevant proposed development (e.g. industry, urban, agriculture, mining) in the area that could impact population (and demand), and when such development is expected.

Based on the projected QGSO regional profile, population growth and local knowledge (council planning, proposed development, etc.), identify one or more likely population growth scenarios for water planning purposes. The annual population growth rate should be applied to project the population for the next 20 years. If basing a population growth scenario on QGSO projections, then the growth rate should be applied to the last year of data available, which may not be the most recent financial year.

The population growth trend can be represented in a graph, and it will generally also include the historical population data. See the example below with two possible scenarios.

Example text

From the SA2 regional growth projections (which includes the adjoining urban community and an expanse of rural area), the expected growth rate is 2.1% per year. However, from the analysis of previous data (from January 2001 to January 2016), the historical growth of the community has been a steady 1.6% per year. Therefore, both scenarios will be considered for assessing long term water supply planning (refer to graph below).

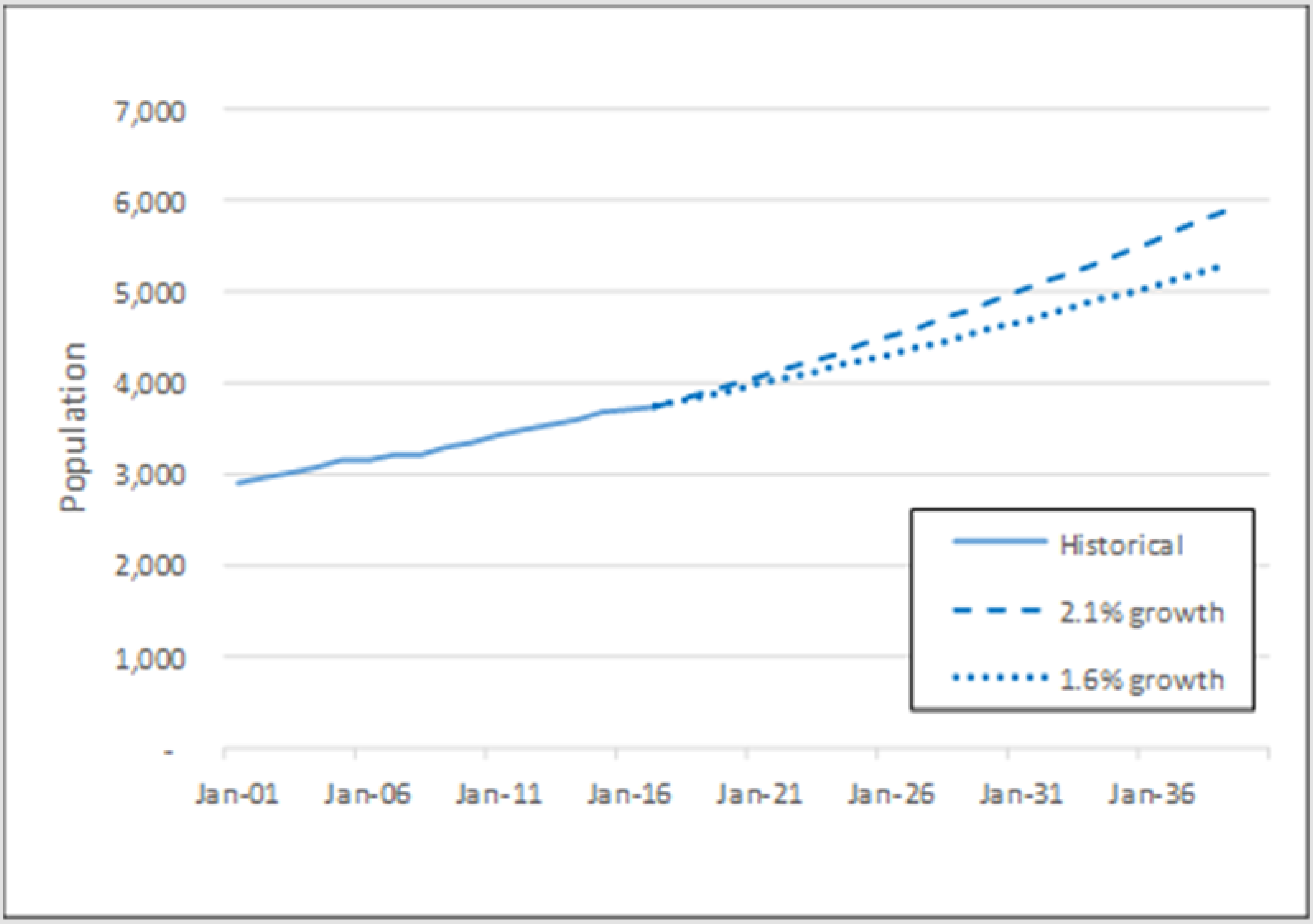

Figure 7: Historical and projected population

4.3 Non-residential customers and itinerant population

Provide information on past non-residential water customers, and any expected changes in the non-residential customer sector to use as the basis for growth estimates for this group of customers. Provide actual data if available and include information on any trends or predictions for the future.

Provide an overview of the historical number of non-residential water connections, back 20 years or as far back as data is available. An example is provided in Table 5, together with a statement on growth (see section 5).

Table 5: Connections to non-residential properties

	2014	2015	2016	2017	2018	2019	2020	2021
Number of non-residential water connections (SWIM CS3)								

Sourced from SWIM data as set at 30th June in each year from 2014 onwards

Data can be sourced from the SWIM database <www.swim.qldwater.com.au/adt> (CS3 Connected non-residential properties) from 2014 onwards.

Provide a statement including information on expected changes in non-residential water demand, for example:

- based on historical information of non-residential connections, is the non-residential sector expanding or contracting?
- is local manufacturing expected to expand or contract?
- has land been released to support an industrial park?

Use local urban planning instruments, development applications and local knowledge.

Water use by the itinerant (transient) population is incorporated in the total urban water use figures for the water service as either:

- residential, if the visitors are staying in a residential home, as per ABS visitor number data, or
- commercial, if associated with hotels, motels, caravan parks, restaurants, or municipal parks and g

Provide a statement on the level of itinerant population including details such as:

- whether or not the itinerant population is significant compared to the permanent population.
- whether there is a large perpetual, variable or seasonal transient population (e.g. is it a large tourism centre, fruit growing area (with seasonal harvesting), or mining area with fly-in-fly-out)
- information on peak seasons and trends in itinerant population (include numbers where available)
- where the itinerant population takes water from (e.g. is water provided for 'grey nomads' at free camping grounds?).

Data for visitors to communities is available for each census year at ABS community profiles. Owners of accommodation could also be a source of information about levels of tourism at different times of the year. Another source of information is Tourism Research Australia's Local Government Area Profiles accessed through <www.tra.gov.au>[5].

Provide a summary of how non-residential water demand will be projected, with the potential options being:

- non-residential demand growth will remain proportional to residential demand growth
- current trends of non-residential water use are expected to continue into the future
- additional volume will be required to service growing non-residential demand (possibly associated with a particular industry)
- non-residential demand will decline (assumed business/industry shut downs or expansion and/or itinerant population decline or increase).

[5] Tourism information <www.teq.queensland.com/research-and-insights/domestic-research/tourism-profiles>, <www.tra.gov.au/International/international-tourism-forecasts> and <www.tra.gov.au/Regional/Local-Government-Area-Profiles/local-government-area-profiles>

Example text

In Waterville the non-residential water use has remained relatively constant between 2014 and 2020.

There are firm plans in place to expand production at the Thing processing plant. It is expected that the plant capacity will be increased by 15% over the next 10 years. This will require an additional 100 ML/a of water. It is unlikely to impact the local workforce significantly.

Since 2001 the visiting population to Waterville, primarily staying in residences, has varied from 16 to 30 people a night (2.0-2.6% of the fixed population) in the last four censuses.

The town has recently achieved RV Friendly Town status, which is issued by the Campervan and Motorhome Club of Australia. This is intended to increase the number of short stay visitors to Waterville. This is expected to increase water use at the caravan park.

Based on this expected increase in non-residential water demand, it is assumed that non-residential water use will increase at the same rate as residential population.

Some water service providers describe 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. This approach can provide a comprehensive understanding of water use by different water users across the reticulation network. Using this approach however can make it more difficult to compare actual water use across the sectors, and can be more difficult to relate back to changing population profiles.

5 Water demand and water users

Provide information on historical water use for the community. Understanding the historical demand can reveal trends of water use behaviour for the community and support development of demand projections for the future.

It is also important to understand when restrictions have been in place and what effect these have had on demand.

5.1 Water demand management

Current restriction schedule

Describe the current level of water restrictions in place and how long these have been active, including whether the restrictions apply only to residential users or to all users.

Include triggers and target reductions in demand if available. Specify if no restriction schedule (regime) is in place.

A drought response plan should outline the restriction schedule (if any).

Example text

As part of the Someplace Regional Council, Waterville is subject to four tiers of water restrictions. The restrictions primarily target outdoor water use and were last reviewed in 2017. A whole of region approach was adopted when developing the restrictions so that the whole community (irrigators, urban residents and businesses) are expected to reduce their water as storage levels reach low levels.

Table 6: Drinking water service water restriction schedule

Restriction level	Trigger		Target use (L/p/d)	Target % reduction in urban water use
	% storage in dam	Typical announced allocation of medium priority∞ (irrigator reduction)		
PWCM	Above 30%	100%	400	0%
Low	30%	<100% - >50%	360	10%
Medium	25%	<25% - >25%	340	15%
High	20%	0%	300	25%
Extreme	15%	0%	280	30%

∞The water restriction triggers were developed in consideration of available water to irrigators (i.e. the announced allocations of medium priority water users within the water supply scheme).

Historical restrictions

Describe the history of restrictions for the community for the last 10 years including, where possible, details of duration, severity and effectiveness. This can be useful for future demand management, and analysing historical demand.

Include details of when water restrictions have been introduced (month/year), how long they were in place and the severity (level).

If possible, provide information on what reductions were achieved in demand, how well the community responded to the restrictions, and whether enforcement notices were issued etc.

Some information on restrictions is reported in the SWIM <www.swim.qldwater.com.au/adt>. Information may also be sourced from in-house records and knowledge of council staff.

Education and efficiency programs

Provide details of any demand management programs that are in place, or that have been implemented historically.

For any demand management measures, water efficiency education activities and efficiency improvement programs, provide details of:

- the types of programs that have been or are planned to be undertaken
- when they have occurred or what triggers activate particular programs or restrictions levels.

Efficiency programs includes any subsidy programs (e.g. subsidies for the installation of rainwater tanks, replacing garden sprinklers, installing water efficient shower heads), and the introduction of smart meters to improve customer awareness and water use data.

Example text

As part of the Someplace Regional Council, Waterville is subject to four tiers of water restrictions. The restrictions primarily target outdoor water use.

The community was on high level restrictions for an extended period in 2010-2012. The community is currently (as at July 2019) on medium level restrictions, which commenced on 1 November 2018. The key feature of the level restrictions is limited watering times for gardens – one hour, three times a week. A residential water use target of 200 litres per person per day is set as part of the restrictions. The community water use has averaged 210 litres per person per day from January 2019.

With the introduction of medium level restrictions, Council held an ‘old for new’ garden sprinkler swap program that ran over 3 months (Council swapped nearly 800 old sprinklers for water-efficient sprinklers). The uptake of this initiative, community feedback and the responsiveness to the increased restrictions indicate that this was a successful program.

Waterwise awareness resources are also promoted and available on Council’s website.

5.2 Community water demand

Provide historical records for the community’s water use, including comment on what may have impacted water demand.

Provide historical records for the community’s water use in megalitres per annum (ML/a) for both sourced water and delivered water. This information can then be used, alongside population data, to calculate water demand in litres per person per day (L/p/d)

The key definitions are:

- **Average volume of water sourced**: The total volume of water taken from all supply sources (including groundwater, surface water, desalinated water) for subsequent supply via the reticulation network (i.e. subtract any volume of water exported).
- **Average urban water demand**: The total volume of water sourced divided by the serviced population.
- **Average residential water demand**: The total volume of water that is supplied to residential properties from the reticulation network (both metered and estimated volumes) divided by the serviced population.

- **Average non-residential water demand**: The total volume of water that is supplied to non-residential properties from the reticulation network (both metered and estimated volumes) divided by the serviced population. This volume can be significantly affected by itinerant population.
- **Water losses**: Total system losses can be calculated by subtracting the volume of water supplied from the volume of water sourced. Where available, provide information on total system losses and its components of real losses (e.g. leakages) and apparent losses (i.e. unauthorised use and metering inaccuracies).

Include notes on matters that may have impacted on demands such as extra-ordinary weather patterns, implementation of demand management measures (such as restrictions), and significant changes to the non-residential water sector (e.g. the opening or closing of a large business). Describe what is considered to be the main contributor to system and distribution losses (e.g. aging reticulation network, water treatment plant processes). If reliable water losses data is not available, provide information on non-revenue water, its components and drivers.

Presenting this information graphically can allow trends to be more readily identified, particularly if monthly demands are able to be graphed.

Data (for urban and residential water demand) can be sourced from water treatment plant records (daily or monthly), council water meter records, water treatment plant records, council billing data or the SWIM database <www.swim.qldwater.com.au/adt>.

Example text

Based on historical data from 2013-2020 (refer to Table 8):

- The average urban demand of Waterville ranged between 310–380 litres per person per day.
- The average water use of Waterville residents averaged about 300 litres per person per day.
- The losses for the network are estimated at 15% (most of which are attributed to real losses through the network).
- Water use tends to reduce during the winter months by around 15-20% on average.

Table 7: Historical water demand

Measure	Units	SWIM indicator*	…earlier years[◊]	20XX	20XX	20XX	20XX	20XX
Serviced population	(000s)	CS1[ϕ]						
Connected properties	(000s)	CS4						
Water sourced (excluding recycled water								
Surface	ML/a	WA1						
Groundwater	ML/a	WA2						
Marine desalination produced	ML/a	WA61						
Imported (raw and treated)	ML/a	WA223[☺]						
Exported (raw and treated)	ML/a	WA224[☺]						
Total sourced (raw and treated)	ML/a	WA7						
Water supplied (potable)								
Residential	ML/a	WA32						
Non-residential	ML/a	WA34						
Water supplied (non-potable)								
Residential	ML/a	WA91						
Non-residential	ML/a	WA92						
Recycled water								
Recycled water produced	ML/a	WA26						
Recycled water supplied and exported	ML/a	WA152						
Metrics								

Measure	Units	SWIM indicator*	…earlier years◊	20XX	20XX	20XX	20XX	20XX
Total water sourced for the service (minus any water exported)	ML/a	WA7-WA224						
Total water supplied	ML/a	WA91+WA92+WA32+WA34						
Average urban demand	L/p/d	water sourced for the service ([WA7-WA224]x1000000) / (CS1x1000) / 365						
Average residential demand (average volume supplied to residential customers)	L/p/d	([WA91+WA32]x1000000) / (CS1x1000) / 365						
Average non-residential demand□ (average volume supplied to non-residential customers)	L/p/d	([WA92+WA34]x1000000) / (CS1x1000) / 365						
Non-revenue water+	%	(WA7-[WA32+WA34]) / WA7						
Real and apparent losses	%	(WA7-WA224-AS56) / WA7						
Real and apparent losses	L / connected property / day	(AS56x1000000) / (CS4x1000) / 365						

φQGSO population data may be used in place of SWIM population data if considered more reliable

*Refer to qldwater's SWIM Indicator Handbook (accessed through <www.qldwater.com.au>) for a full listing of SWIM Indicators

◊ Use data from sources other than SWIM (e.g. water treatment plant records, billing data) to gather as much historical information on the various water metrics.

☺ The current SWIM codes for water imported or exported to another service are WA223 and WA224 respectively. Previously in SWIM it was only reported if the water was imported or exported to another service provider–WA45 (or WA110 excluding recycled water) and WA46 respectively. As it is the water required to meet the needs for a particular water service, information on volumes exported or imported from another service, whether or not it is managed by the same water service provider, is informative. Where this historical information is unknown, the previous codes for volumes imported/exported can be used.

□Non-residential includes commercial, municipal and industrial users that source water from the reticulation network

+Non-revenue water is the difference between the volume sourced/extracted (minus any water exported) and the volume supplied. It includes losses from transmission mains, storage facilities, backwash of treatment plants, and water for firefighting, as well as losses such as water theft and metering inaccuracies. Losses might be known by the service provider or can be estimated by comparing data on water sourced or produced with data on water supplied to customers (e.g. billing data). For schemes supplied with potable and non-potable water, WA8 and WA9 can be used instead of WA32 and WA34 to calculate non-revenue water.

6 Impacts of weather variability and climate change

Weather variability and climate change can impact either or both source reliability and water demand.

To understand water demand trends for a community, it can be useful to look at consumption data alongside temperature and rainfall data. Comparing the short-term rainfall data against long-term rainfall statistics will indicate if a given period was particularly dry, wet or average. This can help to determine whether the historical average urban demand (refer to section 0) is a true representation of the community’s water behaviour.

Looking at climate change predictions for the area can indicate the risk to changes in supply (availability and reliability) and demand due to changes in weather patterns.

Historical weather/climate data is available in the ‘climate data online’ section of <www.bom.gov.au>.

Climate projections are available at <www.longpaddock.qld.gov.au> and <www.climatechangeinaustralia.gov.au>.

6.1 Weather information

Provide historical weather statistics for the time period in which weather data is available, and for the period in which water use data is available.

Provide a description of the weather history for the area, including:

- long-term average statistics (for at least 20 years) for monthly rainfall
- monthly rainfall, for the period for which water use data is available, compared to long term average monthly medians[6]
- if it is considered that temperature might impact water demand:
  - long-term (least 20 years) mean monthly maximum temperature
  - mean monthly maximum temperature, for the period for which water use data is available, compared to long term average monthly rainfall medians.

The use of long-term medians (50th percentile) is considered more representative than the use of a ‘smoothed’ average/mean.

Rainfall and temperature data can be found in the ‘climate data online’ section of the BoM website <www.bom.gov.au>. If there is no weather station available for the community, use the nearest station within the same climate region/area.

[6] The average *monthly rainfall* is the arithmetically averaged total amount of precipitation recorded during a calendar month. In contrast, the *median (decile 5 or 50th percentile) monthly rainfall* value marks the level dividing the ranked data set in half, i.e. the midpoint of the ordered (lowest to highest) monthly precipitation totals. Because of annual variability in rainfall, a length of less than 30 years of rainfall data may not generate reliable statistics, and such information should be used with caution.

Mean *monthly maximum* temperature refers to the average daily maximum air temperature, for each month and as an annual statistic, calculated overall years of record. Five to ten years of temperature data can provide a reasonable estimate of the mean, although probably not of the extremes.

Example text: for graphical presentation

The graphs below provide historical rainfall and temperatures which have been used to determine how the period being considered compares to the long-term average for the area.

Figure 8 indicates that during the analysis period, monthly rainfall data generally showed higher 'highs' and lower 'lows' than the monthly average values. This aligns with climate change forecasts for the region—that suggest more extreme weather is likely in the future. This could impact on both water supply availability and water demand. See Section 6.4 for more on this.

Figure 9 indicates that temperature, as reflected by the mean monthly maximum, was overall fairly closely aligned to the long-term medians for the area.

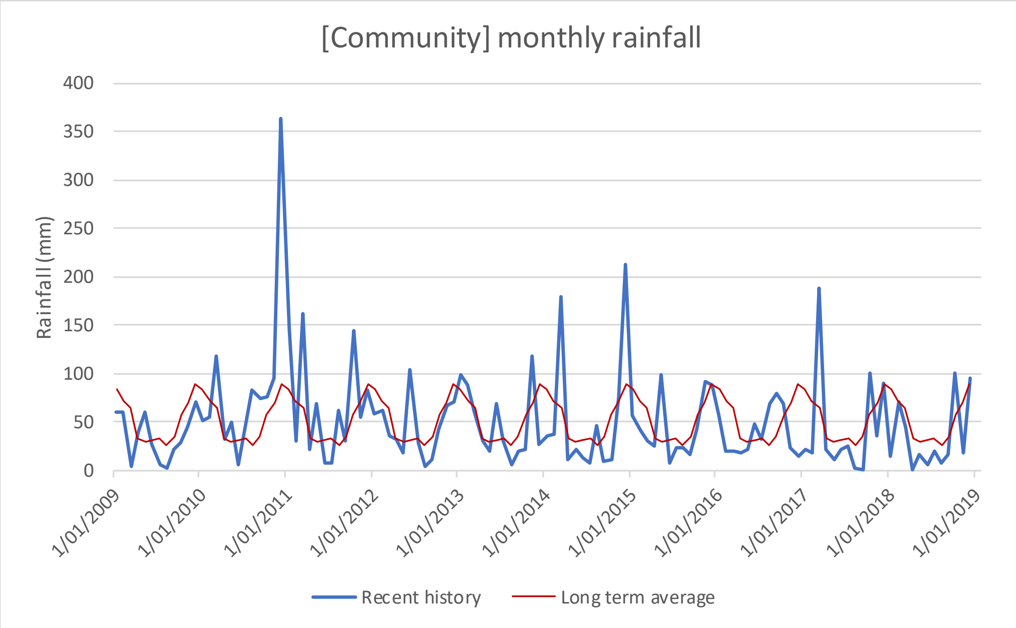

Figure 8: Monthly and average rainfall data

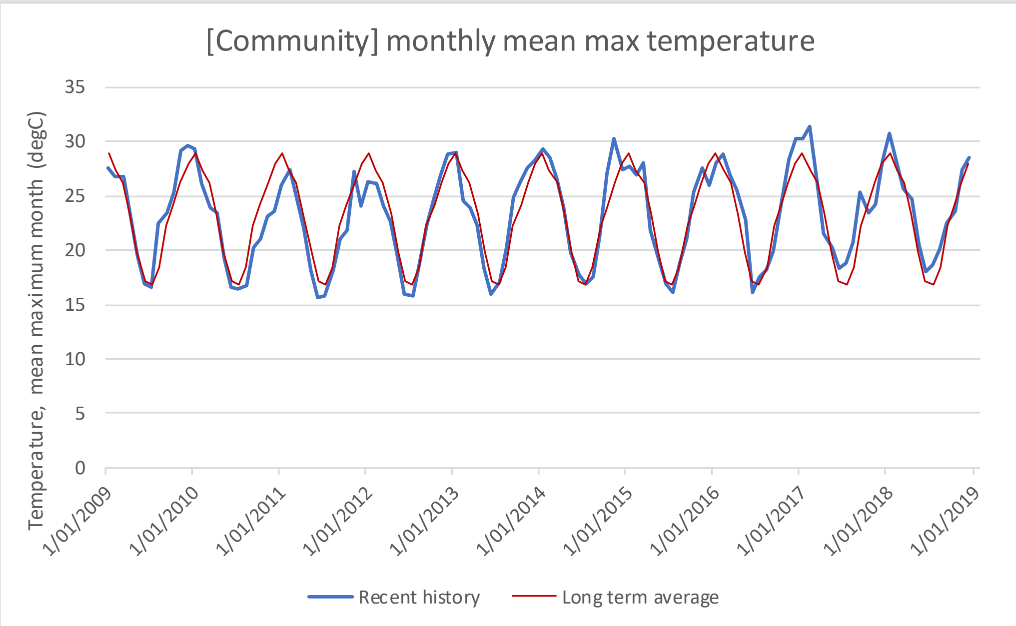

Figure 9: Monthly and average temperature data

Example text: for tabular presentation

Figure 8 provides the annual mean, minimum and maximum rainfall over the period for which the weather station data is available and the period for which water use is available. Table 8 shows average monthly statistics for the same period.

Figure 9 indicates that, on an annual basis, the period for which water use data is available was drier / wetter / had fewer extreme events / about the same average rainfall conditions compared to the historical record.

If there is seasonality to rainfall include: Table 10 shows that there is a definite wet/dry season with most of the rainfall falling in the summer months.

(If temperature is thought to impact water demand, provide temperature data in a similar manner).

Table 8: Annual rainfall for community (2008-09 to 2020-21)

Location	Annual rainfall (mm)					
	Historical (available weather station data)			Period for which there are water use records (XXXX – YYYY)		
	Lowest	Mean	Highest	Lowest	Mean	Highest
AAA gauge station (XXXX – YYYY)	mm (year)	mm	mm (year)	mm (year)	mm	mm (year)
BBB gauge station (XXXX – YYYY)	mm (year)	mm	mm (year)	mm (year)	mm	mm (year)

Table 9: Average monthly rainfall for community (2008-09 to 2020-21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly rainfall (mm)												

6.2 Drought declarations

Provide further information on usual vs drought conditions for the community.

Provide details of current and historical drought declarations.

Refer to <www.longpaddock.qld.gov.au>. Consider both the community and surrounding areas.

6.3 Effect of weather on water use

Provide analysis of how community water use trends were affected by weather in the past, to support the development of demand projections for future planning scenarios.

Compare water use (residential and/or total) with rainfall data (and, if relevant, temperature) for the same period. This data can be plotted in a graph. Water use can be expressed as monthly or annual volumes. Monthly data provides a better understanding of the water use pattern during the year in relation to rainfall and temperature. An example of using monthly data compared to annual data is provided in the example below (both of these graphs indicate that water use generally increases during drier periods). When interpreting both types of graphs, consideration should be given to periods when water restrictions were in place, including the severity and duration of the restrictions.

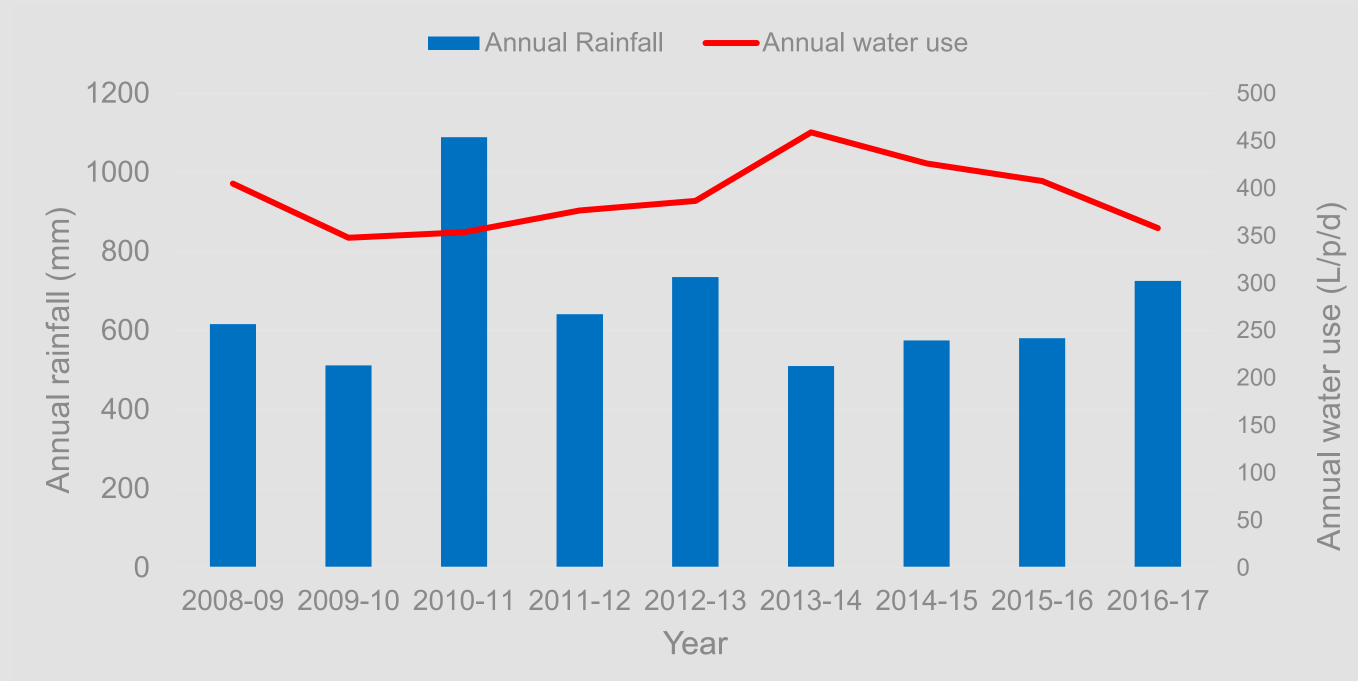

Figure 10: Daily average water use and rainfall (using annual data)

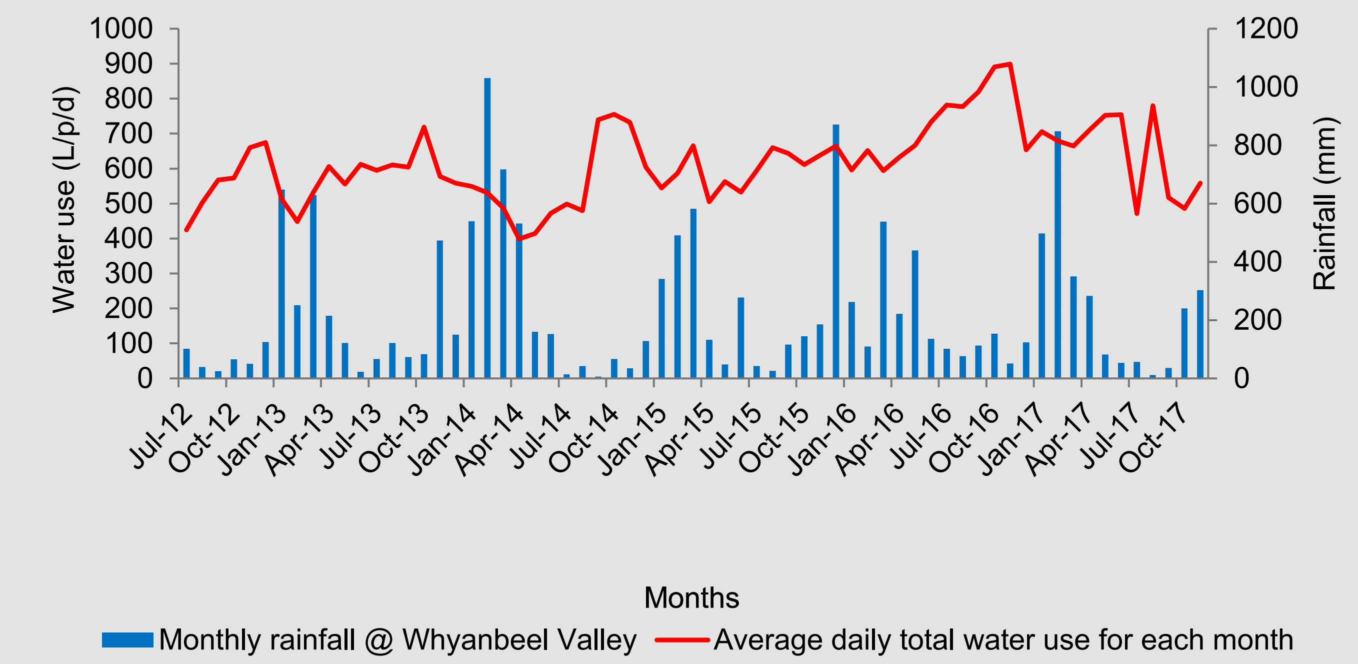

Figure 11: Daily average water use and rainfall (using monthly data)

6.4 Climate change

Identify future changes in temperature, rainfall and evaporation that may impact future water demand and access to climate dependent water supplies (surface and groundwater).

Provide a summary of what the climate change projections are for the region in which the community is located. While the precise impacts of climate change are uncertain, analysis of how climate change might impact supplies and demand should be considered.

As a guide to interpretation:

- Residential water demand tends to be slightly sensitive to changes in temperature, moderately sensitive to changes in rainfall, and relatively insensitive to changes in evapotranspiration.
- Surface water supplies tend to be relatively insensitive to changes in temperature, very sensitive to changes in rainfall (both total volumes and patterns), and sensitive to changes in evapotranspiration.
- Groundwater supplies are complex, but as a generalisation, tend to be insensitive to changes in temperature and evapotranspiration, and sensitive to changes in rainfall (both volumes and patterns).

Region-specific information about climate change in Queensland can be found at:

- Queensland Government's climate change science resources <www.qld.gov.au/environment>, including the climate change in Queensland map application (accessed by searching for 'climate change in < https://qgsp.maps.arcgis.com>)
- The Long Paddock future climate dashboard, and (current and historical) drought declarations (accessed at <www.longpaddock.qld.gov.au>)
- CSIRO resources on climate change projections <www.climatechangeinaustralia.gov.au>
- Bureau of Meteorology climate change data on trends and extremes (search for 'climate change trends' on <www.bom.gov.au>)
- Australian Government Climate Change in Australia resources, including the climate futures tool, and the regional map explorer (accessed through <www.climatechangeinaustralia.gov.au>).

Example text: based on Queensland Government information

Waterville is located in the Whatever climate region. The following predictions are made for climate change impacts on this region by 2050 (relative to a reference period 1986 to 2005):

- The median annual temperature is projected to increase by 1.6°C under a lower emissions scenario and 2.1°C under a high emissions scenario.
- The median value of annual rainfall is projected to decrease by 3% under a lower emissions scenario and 4% under a high emissions scenario. However there are a large range of projected rainfall changes from an annual increase of 15% to a decrease of 21% under a high emissions scenario.
- The median value of annual potential evaporation is projected to increase by 5% under both lower and high emissions scenarios.

The above climate change predictions suggest that:

- some climate change-driven increase in residential water demands by 2050 is likely
- surface water supplies are likely to become less reliable
- the impacts on our groundwater supplies are difficult to determine, so it would be useful to undertake an assessment of the supply reliability.

Example text: based on CSIRO / Australian Government information

Waterville is located in the Whatever climate change cluster. The following predictions are made for climate change impacts on this region:

- Average temperatures will continue to increase in all seasons (very high confidence).
- More hot days and warm spells are projected with very high confidence. Fewer frosts are projected with high confidence.
- Average winter rainfall is projected to decrease with high confidence. There is only medium confidence in spring decrease. Changes in summer and autumn are possible but unclear.
- Increased intensity of extreme rainfall events is projected, with high confidence.

The above climate change predictions suggest that:

- some climate change-driven increase in residential water demands in the future is likely
- where water storage is large enough, it is possible the reliability of surface water supplies will be generally maintained
- there are no clear indications that the reliability of groundwater supplies will be impacted.

7 Water security assessment

Provide an assessment of the ability of the system to meet current and future demand for water under a range of scenarios. This should include, as a minimum, a typical conditions scenario and an ongoing drought scenario.

The water security assessment will need to simultaneously consider water entitlements, reliability of water sources (based on historical reliability and climate change projections), infrastructure capacity, population projections and expected future water demand.

7.1 Typical conditions scenario

Provide a demand projection, along with a description of how future water demand was projected (i.e., the assumptions). This should be based on business as usual/'normal' conditions (i.e. 'normal' unrestricted demand) and, to ensure robustness of planning, it is suggested higher demand be considered as a sensitivity to account for possible climate change impacts.

Higher demands are important to consider if water use is impacted by hot, dry conditions, and particularly if the water service is primarily supplied from a shorter duration storage (e.g., a storage that can meet only 1-2 years of demands).

7.1.1 Simple approach

The simplest approach to predicting future urban water demand for the community is to assume:

- population projection scenario/s as described in Section 4.2
- the average total urban water demand (L/p/d) will be constant and will be equal to the average for the last [10] years from Table 7
- non-residential demand (such as commercial, municipal and industrial) is included in the assumed average urban demand (L/p/d) and grows proportionally to the growth in the residential population/demand.

The key calculation is:

{(Average urban demand for all uses L/p/d) x estimated population in the year [20xx] x 365}/1,000,000 = anticipated average water demand in 20xx in ML/a

See Table 10.

Table 10: Summary of key assumptions for demand projections (simple)

Scenario	Population growth (% p.a.)	Total water demand (L/p/d)
#1—based on current demand		e.g. current average
#2—demand management		e.g. reduced average
#3—hot, dry conditions*		e.g. increased average
#4—other		

*Assessment should be for the duration of a severe drought cycle.

7.1.2 Complex approach

This approach is most valuable when there are expected to be significant changes to the consumption of water by non-residential customers in the community.

Predicting future urban demand can be done by:

- Separately calculating residential water demand and non-residential water demand then combining them.

- Where population growth is expected to involve development that is different to current urban design (i.e. higher or lower density than existing dwellings), consideration should be given to likelihood of different water behaviours, and consequently different water demands (e.g. high density housing/smaller lot sizes are likely to have less water demand from reduced outdoor water use). Therefore, it may be appropriate to have different demand estimates for different sectors of the population to achieve more realistic future demand estimates.
- In the case of using supply volumes rather than source volumes for this calculation, an additional pro-rata factor would need to be applied to incorporate losses associated with the demand (and therefore calculate total source volume demand).
- Considering the potential net effect of climate change and adopted demand management. This could be done by increasing average demand over time to reflect the potential impacts of climate change. Alternatively average demand could be reduced over time to reflect potential impacts of demand management activities.
- A sensitivity case may be applied to reflect uncertainty. E.g. applying a +/- [10%] sensitivity case to the base demand forecast to accommodate uncertainty in population forecasts and water demand behaviours of the community.

See Table 11.

Table 11: Summary of key assumptions for demand projections (complex)

Scenario	Population growth (% p.a.)	Residential water demand (L/p/d)	Non-residential demand	Climate change (% growth in demand p.a.)
#1—current demand				
#2—lower demand (e.g. demand management)		Decrease to X L/p/d in year [20XX] with demand management	Decrease by x ML/a in year [20XX]	
#3—higher demand (e.g. hot, dry conditions, higher population growth)		Increased to X L/p/d in year [20XX] reflecting demands in hot, dry conditions (no restrictions)	Increase by x ML/a in year [20XX]	
#4—other				

Example text

The table below shows the projected average urban water demand for Waterville for two population growth scenarios (as discussed in Section 4.2).

Table 12: Projected future water demand

	Projected average urban demand (ML/a)					
	2018 (current)	2020	2025	2030	2035	2039
Business as usual – 2.1% p.a. growth	4275	4446	4755	5078	5405	5701
Business as usual – 1.6% p.a. growth		4238	4392	4547	4701	4825

7.1.3 The supply and demand balance

Bring together the water supply information and the demand projection for the community in typical conditions (and considering potential scenarios).

Example text

The figure below presents the water supply and demand balance for Waterville for the next 20 years in a typical conditions scenario. It includes the projected average urban demand for three growth scenarios, compared to the combined water entitlements (from Section 2.1) and infrastructure capacity (from Section 3).

The figure below shows that:

- there is sufficient water entitlement to meet projected demands until beyond 2040.
- there could be a need to upgrade the capacity of the water treatment plant (current bottleneck—refer to Section 3.1) before 2040, dependent on population growth and water demand.

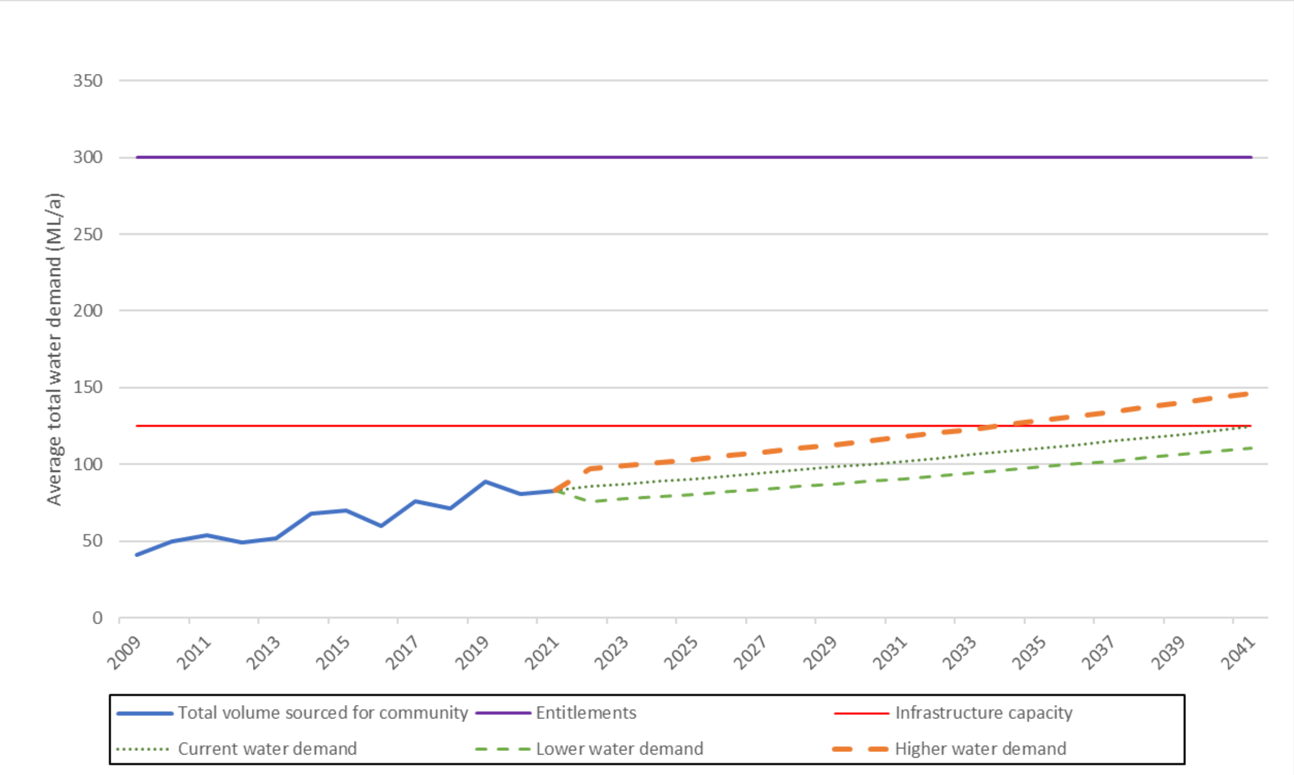

Figure 12: Historical and future water use

The historical reliability indicates that, under normal conditions, the source is adequately reliable to meet current demands. However as time progresses, there might not be sufficient flow to meet significantly increased demands.

7.2 Ongoing drought scenario

Forecast the water balance for one or more drought scenarios, using the information collated. Consider the likely effectiveness of demand management measures and potential impacts on water supply sources, including contingency and emergency supplies.

With consideration to what might be restricted demands during a sustained drought situation and what water supplies might be readily accessible, provide the water balance. Consider the likely effectiveness of demand management measures and potential impacts on water supply sources, including contingency and emergency supplies.

Note: Such conditions are separate to considerations for operational emergency responses due to infrastructure failure.

To forecast the water balance for one or more drought scenarios, consider effects on both demand and supply:

- the potential rate of reduction of demand/consumption in response to demand management measures
- the potential reduction in availability and reliability of surface and groundwater supplies
- the higher and lower demand scenarios considered in the 'typical conditions' scenario and the impact such demands could have on demand management measures.

7.2.1 Restricted demand

To assess restricted demand, consideration should be given to the following:

1. What would the average urban demand need to be reduced to if only high reliability (i.e. 'drought resilient') supplies and contingency supplies are available during a drought period?
2. Is this demand feasible to achieve?
3. How does the possible timing for new contingency supplies compare to planning for normal growth?

As a guide to understanding potential reductions in residential water use:

- Figure 13 presents the variation in average residential water use calculated for approximately 240 drinking water services in Queensland using all available SWIM data 2007/08 to 2017/18. This shows that communities have most commonly used an average of 250-300 L/p/d (the mode), the median (50% use more and 50% use less) is ~500 L/p/d.
- There are multiple examples of communities in Queensland who have used less than 100 L/p/d for sustained periods (one to three years) since 2010.
- During the Millennium Drought, residents of SEQ reduced water demand to 140 L/p/d for approximately two years (from mid-2007 to mid-2009), with the regional low of 130 L/p/d being underpinned by even lower levels in key local government areas in the region.

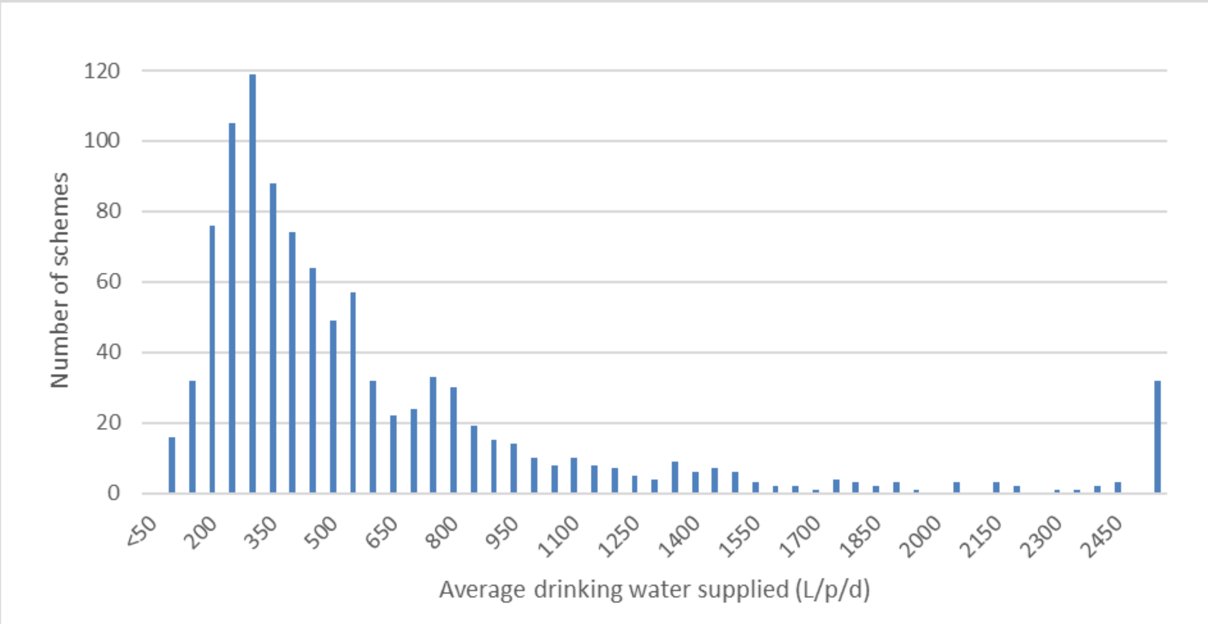

Figure 13: Average urban demand across Queensland

Example text

Council has access to 300 ML/a of reliable groundwater entitlements to supplement usual surface water supplies during drought periods.

The bores alone could support the community during a sustained drought if:

- non-residential demand is not restricted, but
- residential demand is restricted according to the table below.

Given that the 'normal' average water use for Waterville has been 310-380 L/p/d for all uses, it is considered achievable to reach the restriction targets set out below. Therefore no additional contingent supply is likely to be necessary before 2039 to manage possible future droughts.

Table 13: Calculated restricted demands over time

Scenario	Drought-restricted supplies (L/p/d)					
	2018 pre-drought	2020	2025	2030	2035	2039
Growth scenario 1	310-380	290	270	250	235	225
Growth scenario 2		300	290	280	270	265

8 Moving forward

Provide a summary of any actions or investigations that are proposed to assist in providing for ongoing water supply security.

Based on the assessment, potential risks to water supply security might have been highlighted. Outline any actions that will be undertaken to manage these risks and/or to help provide for ongoing water supply security for the community. Consider:

- investigations into losses, high demands or individual high water users
- additional water monitoring or data that might be beneficial to provide a more robust water security assessment in the future
- planning and implementation of augmentations or enhancements to current infrastructure capacity to ensure sufficient continuity and security of supply
- development of level of service objectives for water supply security
- revision to the current drought response to ensure security of supply during drought, based on current demands and likely demand reductions
- regular review (at least every 10 years) of asset management activities and planning, including documentation of any asset management plans, leakage management activities etc
- regular review (at least every 10 years) of key capacity constraints (i.e. potential bottlenecks) in the source, treatment and/or distribution infrastructure, including consideration of how such constraints impacts asset management planning
- regular review (at least every 10 years) of proposed drought management response, including consideration of the potential effectiveness of the demand management measures, and the readiness and availability of any contingency and emergency supplies
- regular review (e.g. every 5 years) of demand forecasts, including a review of population projections
- regular assessment (e.g. every 10 years) of the timing of potential future supply augmentation, taking into consideration current demand projections and options for future supply augmentation.

Example text

The ‘normal’ average water use for Nantasket has been 650-750 L/p/d for all uses. It is not considered sustainable to maintain reduced demands provided in the table below. Considering this, further drought contingency supplies need to be identified as soon as possible, or substantial education needs to occur to reduce demand in ‘normal’ times and provide a lower risk base for introducing significant water restrictions in the future.

Projected average total urban water demand (L/p/d)	Non-drought demand (current average demand)	Future drought supply (restriction target) with existing supply				
		2020	2025	2030	2035	2039
Growth scenario 1	650-750	190	170	150	135	125
Growth scenario 2		200	190	180	170	165

Table 14: Calculated restricted demands over time

9 The water security statement for [community]

Provide a high level summary of the current water supply status, including an understanding of current reliability, as well as projections for when additional infrastructure might be required.

This section should be completed following the assessment considerations outlined below. It may be determined that this is the only part of the assessment that is published.

The water supply security position for the community is summarised by:

- key water sources for the community, including entitlements and yield assessments (if available)
- historical reliability of water supplies, and historical demand (with reference to total water sourced (average) ML/a for all uses (average L/p/d); residential water use (L/p/d)
- projected future water demand
- water infrastructure capacity and future needs for infrastructure upgrades or augmentation
- future needs for water supplies to sustain projected growth
- contingency and emergency supplies, with consideration for sustainable yield
- contingency supplies needed to support demand for source water in the event of severe drought (in xx L/p/d (at current population levels)
- current targets for water restrictions and whether this is considered achievable
- likelihood that new contingent water supplies will be required by a specified date
- any additional water supply security risks, including consideration of climate change impacts
- when this assessment should be reviewed, and triggers for a review.

Provide a summary of key moving forward actions, i.e. actions that will be undertaken to improve water supply position of the community (if needed).

Include a graph illustrating the supply and demand balance (refer to section 0).

Example text

The water supply security position for Waterville is summarised as:

- Currently water is sourced for the community primarily from Blue River.
- The water treatment plant has a maximum output of 50 000 L/day.
- The average total water sourced is 350 L/p/d for all uses (based on data from 2008 to 2019).
- Based on a demand of 350 L/p/d it is estimated that by 2040 the water demand of Waterville will be up to about 600 ML/a of water
  - the water treatment plant will need to be upgraded / augmented by about 2026 to sustain projected growth in the community
  - new water supplies will need to be accessible by about 2032 to sustain projected growth in the community
- There is 300 ML/a available from contingency groundwater supplies which are considered reliable
- In the event of severe drought, restricted demands in the order of 225 L/p/d could be required by 2040 which is considered achievable by the community. It is expected that no new contingency supplies will be required before 2040.
- Potential water supply security risks:
  - Reliance on groundwater supplies during drought: the assumed reliability of groundwater supplies needs to be confirmed
  - Demand levels not being maintained: Ongoing education and demand management to ensure restriction targets can be met during severe droughts
- This assessment will be reviewed in five years, or sooner if demand exceeds the projected 2025 demands.
- The following actions are planned to improve the water security position of Waterville:
  - Undertake an investigation into water losses with a view to implement appropriate water loss reduction measures
  - Review Waterville’s drought management plan, particularly the water restrictions
  - Refine asset operations to optimise use of water supplies.

10 Definitions

Contingency supply
A planned response to increase the likelihood that the expected demands will be met when 'usual' supplies are compromised (for example during drought or during infrastructure breakdown). The contingency supply augments the urban water supply, either temporarily or permanently. Examples include new bore, temporary desalination plant, accessing local waterhole, or high volume water carting. Contingency supplies may also include bringing forward planned infrastructure augmentations (dependent on lead times required).

Drinking water service
The infrastructure owned by a provider for single or multiple combinations of the individual components of sourcing, treatment, transmission, or reticulation of a drinking water supply.

Emergency supply
A planned response that is temporary and is required to provide sufficient supply to meet highly restricted demand. It is implemented when there is a low likelihood that 'usual' supplies will be able to meet expected demands or when there are inadequate supplies to meet demands. Examples include low volume water carting, low quality feed water sources (e.g. local waterhole) with high treatment costs, temporary desalination plant. Typically requires significant expenditure of resources.

Entitlement
Refers to a water entitlement. A water entitlement is a water allocation, interim water allocation or water licence. Such an entitlement authorises the take or interference with water. Water allocations typically have a priority group. The priority group relates to the water allocation security objective, i.e. provides an indication of the level of reliability of the water allocation, based on historical performance.

Exported water
Water that originates from within the service, but is delivered to provide water to another service which may or may not be operated by the same service provider. May be raw water or treated water that is potable or non-potable.

Imported water
Water that originates from another water service which may or may not be operated by the same service provider. May be raw water or treated water that is potable or non-potable.

Non-potable water
Water that is not intended for use as a drinking water supply, whether it is treated or not.

Potable water
Water that is intended for use as a drinking water supply and as such is regulated under the *Water Supply (Safety & Reliability) Act 2008*.

Raw water
Untreated surface and/or groundwater either used to directly supply customers of a water service or used as a feed source for a treatment process that supplies customers of a water service. Surface water sourced from marine or brackish environments as a feed for marine desalination is not considered raw water for this purpose. Feed water to recycled water services is not considered raw water.

Recycled water
Water that has been sourced from sewage or effluent, from the service provider's infrastructure including urban stormwater, or from wastewater from industrial, commercial or manufacturing activities, or animal husbandry activities, that is intended to be transferred to another unrelated entity for further use and has fit-for-purpose quality.

Recycled water service
The infrastructure owned by a provider for storage, treatment, transmission, and/or reticulation of recycled water.

Water service
Water supply services to a community, including water harvesting or collection (including water storages, groundwater extraction or replenishment and river water extraction), the transmission of water, the reticulation of water, drainage (other than stormwater drainage), or water treatment and recycling.

Water treatment
Processes such as coagulation, sedimentation, pH correction, filtration, disinfection and softening used to remove particulate matter and contaminants and make the water fit for purpose. Includes advanced treatment process such as reverse osmosis used for desalination of groundwater. Disinfection alone is considered treatment. All potable water must receive some degree of treatment to satisfy the requirements of the *Water Supply (Safety & Reliability) Act 2009*.

11 Acronyms

Acronym	Extension
ABS	Australian Bureau of Statistics
AMTD	Adopted middle thread distance
BOM	Bureau of Meteorology
CSS	Customer service standard
DRDMW	Department of Regional Development, Manufacturing and Water
LOS	Level of service (objectives for water supply security)
QGSO	Queensland Government Statistician's Office
ROL	Resource Operations Licence
SWIM	State-wide information management (system)
WSS	Water security statement

drdmw.qld.gov.au

Queensland Government