2017 Water Security Program Annual report

December 2017

seqwater
WATER FOR LIFE

SOURCE STORE SUPPLY

Document Control

Reviewer			Approved for issue			
Date	Name	Signature	Date	Name	Position	Signature
20/12/17	W.Middleton		27/12/17	D.Spiller	CEO	
21/12/17	R.Muir		27/12/17			
28/12/17	D. Spiller		28/12/2017			

Contents

Executive summary

Seqwater is responsible for long-term planning for a reliable and sustainable water supply in South East Queensland (SEQ), through the 30-year Water Security Program.

Seqwater is required to prepare and report on water security for SEQ annually. This report is for the 2017 calendar year, and follows the release of version 2 of the Water Security Program in March 2017.

Highlights

The highlights for the year include:

- successful completion and release of the updated Water Security Program in March, 2017
- changes to Water Grid operations to increase the flow of water into the northern sub-region, and particularly the Sunshine Coast, to bolster water security
- commencement of significant capital and operational works to further increase the Water Grid's capacity to supply water into the northern sub-region
- commencement of more detailed planning for contingency supply options into the northern sub-region
- initiating preparatory work to achieve a state of readiness for drought response triggers, when required
- announcements for the first drought trigger levels at 70% key bulk water storage capacity in March and October 2017, both of which were followed by significant rainfall and increases to storage levels
- significant progress with the SEQ Service Providers on collaborative drought response planning and governance.

Drought response planning

Climate variability presents a challenge for water planning. In the last 16 years SEQ has experienced a major drought, two major flood events and recently an extended dry spell resulting in drought preparedness actions commencing (refer Figure 1 below). This variability highlights that Seqwater must plan, and be prepared for, a wide range of climatic scenarios.

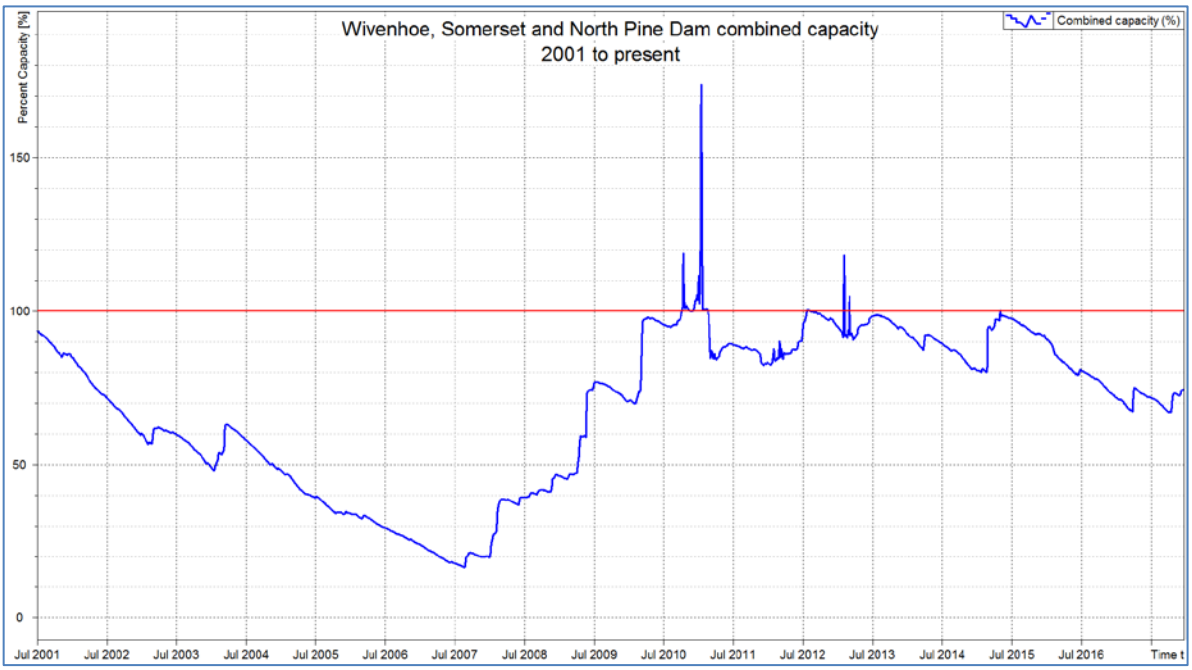


Figure 1: Combined storage capacity of Wivenhoe, Somerset and North Pine dams (2001 to 2017)

The Water Security Program contains the Drought Response Plan, with triggers for actions when the combined level of the region's drinking water supplies reached certain levels.

The Water Security Program also highlights that the northern sub-region, on the Sunshine Coast, will be the first sub-region to require a new bulk water supply source.

Northern sub-region

The 2016-2017 wet season brought into stark contrast how rainfall patterns can differ across SEQ. The northern sub-region, including the Sunshine Coast and Noosa, experienced its second consecutive failed wet season, which is uncommon for the sub-region. Baroon Pocket Dam, the largest storage on the Sunshine Coast, experienced record low inflows. The dam reached 45% capacity in March 2017 prior to ex-Tropical Cyclone Debbie, and before the October 2017 rain again reached 45%. This storage level represents less than one year's supply without the support of the Water Grid.

Compared to other parts of SEQ, the northern sub-region dams are small, with Baroon Pocket, Wappa, Lake Macdonald, Cooloolabin, and Ewen Maddock dams combined equating to less than 5% of SEQ's total water storage capacity. Yet the northern sub-region is 15% of the SEQ region's total demand.

These storages have historically received higher and more consistent rainfall than the majority of SEQ's other drinking water dams. In a typical year, we would use up to 60% of Baroon Pocket's capacity to supply into both the Sunshine Coast and the northern suburbs of Moreton Bay Regional Council. For comparison, the annual allocation of Wivenhoe and Somerset dams is 19% of their capacity. The northern sub-region is also the only region within SEQ which does not have a climate-resilient source to help supplement local surface water supply.

As a result, the northern sub-region storages rely on bulk water transfers from the North Pine and Wivenhoe dams to maintain security.

The October 2017 rainfall was the highest monthly total October rainfall recorded in our drinking water catchments since 2010. Overall the resulting inflows into storages added about three months of additional drinking water supply for SEQ. Baroon Pocket Dam received an increase of more than 20% to lift its levels above 60% capacity. Further rainfall in late November and early December increased the dam's capacity to almost 80%.

Seqwater is making preparations to enable an appropriate response to future droughts in the northern sub-region. The Ewen Maddock Water Treatment Plant was recommissioned and has been operating since August 2017. Seqwater has also revised its Grid operating mode and will continue to move drinking water north from Brisbane into the Sunshine Coast as its normal operation. These initiatives are all designed to help preserve Baroon Pocket levels and supplement drinking water supply for the Sunshine Coast. In addition, Seqwater is undertaking $20 million in infrastructure improvements to the Water Grid to increase capacity to move more drinking water into the northern sub-region should it be required.

The Water Security Program specifies that region-wide contingent supply planning commence when key bulk water storages reach 60% of combined storage capacity. However, recent inflows and demand growth in the sub-region highlight the need for a pre-prepared response to a northern sub-region water shortage, with sub-regional contingency measures and triggers. In response, Seqwater commenced contingent supply investigations and is working with local government, SEQ Service Providers and key stakeholders. This work will continue into 2018.

Our dams in the central sub-region also experienced extended dry spells in 2017. In contrast, our key storages in the southern sub-region have been at, or close to, capacity for much of 2017. During ex-Tropical Cyclone Debbie, Hinze Dam received record inflows into the storage.

Other matters

Major changes to the bulk water supply system over the past year

Seqwater has scoped and is in delivery for around $20M in capital works to improve the capacity of the Water Grid to supply water into the northern sub-region.

Changes to risks to readiness of manufactured water assets in the past year

Seqwater has completed a detailed restart plan for the Western Corridor Recycled Water Scheme which sets out the steps for restart that would be required at the 60% Key Bulk Water Storage Trigger. This has greatly enhanced Seqwater's state of readiness to recommission the scheme, when required. Similar work has been conducted at the Gold Coast Desalination Plant during the year.

Projected regional average urban demand

Water demand is influenced by climatic conditions, population growth and consumption behaviour. Water demand this year rose by 4.4% compared to the previous year. This is consistent with long-term historical trends, the influences observed this year and the assumptions made in the Water Security Program medium demand forecast.

Assessment of the regional water balance

The regional water balance has not changed from the Water Security Program. The Level of Service yield with the current infrastructure and the version 2 drought response measures was determined to be 440,000 megalitres (ML) per annum.

Drawdown scenarios

On a regional basis the key bulk water storages declined to almost 70% capacity in March and September 2017. Sub-regionally the drawdowns were varied with the northern sub-region drawing down more severely than the other regions, but post October and December rainfall has received good inflows. The central sub-region, approximately 70.3% of the total grid capacity (at full supply level) was also declining, and has now received good inflows. The southern sub-region received significant rainfall during ex-Tropical Cyclone Debbie and throughout the year, keeping its storages near capacity.

1.0 Introduction

Seqwater released the Water Security Program version 2 in March 2017. This report can be found at:

http://www.seqwater.com.au/waterforlife

Details about the SEQ Water Grid infrastructure and the sub-regions are provided as Appendix A and B respectively.

The purpose of this report is to provide an update on water security planning and implementation during the 2017 calendar year, in accordance with the *Water Regulation 2016*. This report addresses:

- major changes to the bulk water supply system over the past year
- changes to risks to readiness of manufactured water assets in the past year
- projected regional average urban demand
- assessment of the regional water balance
- relevant drawdown scenarios.

2.0 Major changes to the bulk water supply system over the past year

Changes have been made to the bulk water supply system to adaptively respond to the climatic conditions and resulting declining water storages in the northern sub-region. The changes have been made to improve the Grid capacity to supply water to the northern sub-region, and the Sunshine Coast in particular.

Change in Water Grid operations - moving more water north

The northern sub-region is the most vulnerable to drought conditions due to its small dam capacities, reliance on seasonal rainfall, high demands and lack of climate resilient water source. As a result Seqwater has adapted its Grid operations to increase the flow of water north. This included:

- Baroon Pocket Dam triggers have been increased and as such the use of the Northern Pipeline Interconnector and Ewen Maddock Water Treatment Plant (WTP) will be maximised
- The Northern Pipeline Interconnector and Ewen Maddock WTP are now being used to supply the southern Caloundra supply area, reducing the need for Landers Shute WTP production.

- Operation of the Southern Regional Water Pipeline in a northerly direction will also assist with deferring regional drought response actions. The Southern Regional Water Pipeline will operate in a northerly direction when demands are low enough to be met from local water treatment plants.

Capital works to increase flow capacities to the North

Seqwater has reviewed the infrastructure capacity of the Water Grid to identify key constraints to increasing the flow of water to the northern sub-region. Some 13 capital projects have been identified and scoped during 2017, and are in various stages of assessment and delivery. The capital costs are estimated at around $20 million.

Appendix C provides a list of these projects.

Contingency response for northern sub-regional drought

The northern sub-region on the Sunshine Coast experienced its second consecutive failed wet season, which is very uncommon. Baroon Pocket Dam, the largest storage on the Sunshine Coast, experienced record low inflows. The dam reached 45% capacity in March 2017 prior to ex-Tropical Cyclone Debbie, and before the October 2017 rain again reached 45%. This storage level represents less than one year's supply without the support of the Water Grid.

The Water Security Program established a trigger for investigating drought contingency measures when Key Bulk Water Storages reached 60%, with implementation from 25%.

However, this year has highlighted the need to plan for and manage severe droughts at a sub-regional as well as a regional SEQ level. Hence Seqwater has commenced investigations for contingency measures for the northern sub-region, and this work will continue into 2018.

We have also found that:

- The time to implement temporary measures was likely to be greater than assumed in Version 2 Water Security Program.
- The integration of temporary sources into the SEQ Service Provider network in most cases was deemed workable. However, this wasn't the case in some critical areas which help protect the Baroon Pocket Dam storage, resulting in significant investment in transfer infrastructure, which was unlikely to align with longer-term planning needs.
- The size and nature of the temporary supply source(s) is highly dependent on the ability to implement the measures in a timely manner. If a temporary supply source can be provided earlier in a drought, it can be much smaller than a temporary supply built when storages are significantly diminished.

Finally, the Water Security Program highlights that the next failure to meet Level of Service objectives occurs in the north with Baroon Pocket Dam reaching minimum operating level at frequency greater than 1:10,000. This is forecast to occur around 2040 and represents the latest timeframe that a new source would be required. A severe drought and/or changes to base assumptions (such as climate, demand) has the potential to bring forward the need for a new source.

Drought preparedness

The Water Security Program details an adaptive drought response approach (Figure 2). Seqwater follows this approach in an adaptive manner cognisant of the climatic conditions, water demand, operation of the system and other key influential factors.

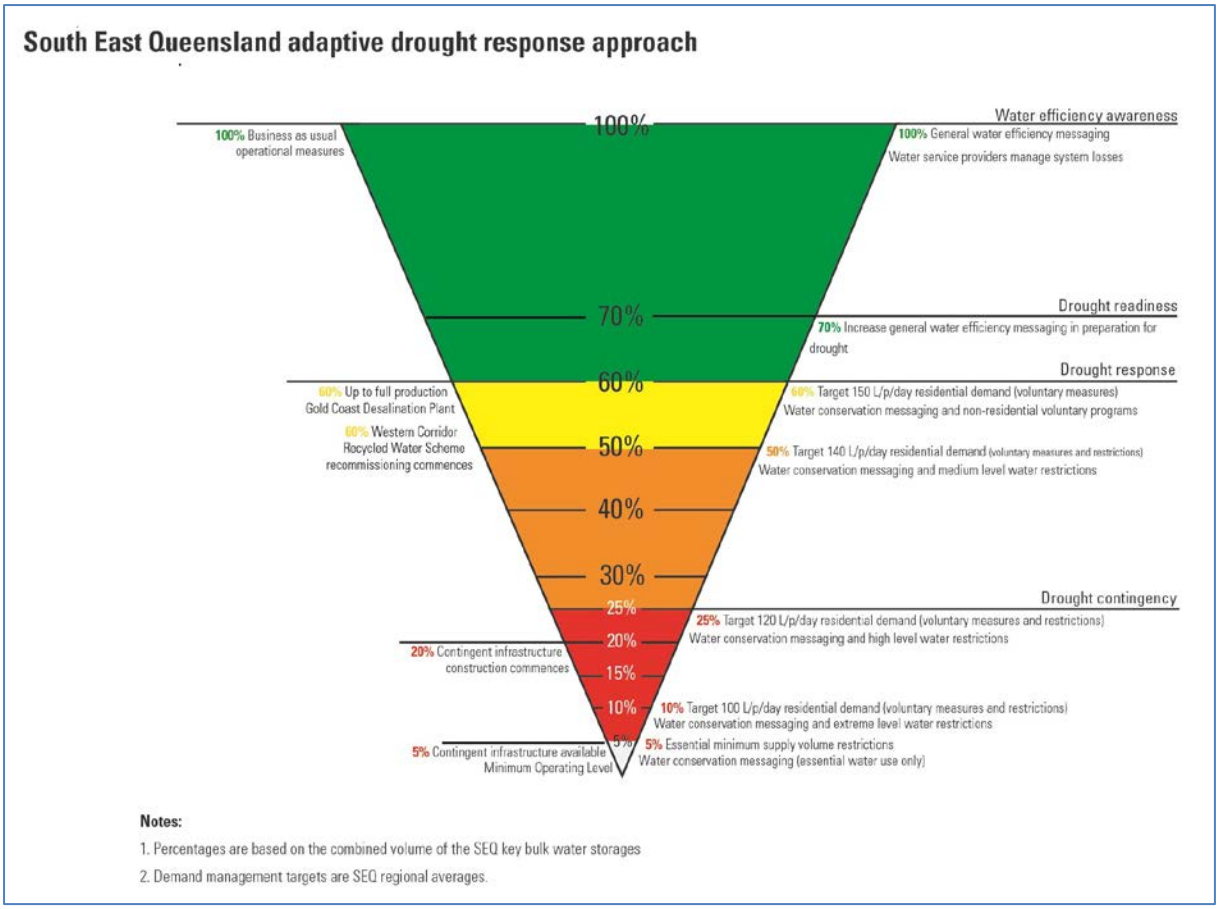


Figure 2: Drought response approach

During 2017, Seqwater has undertaken significant preparatory work to ensure the drought response program can be implemented, when required. Table 1 provides a summary of the preparedness actions for each trigger. Seqwater is working closely with the SEQ Service Providers on drought projects.

Table 1: Drought preparedness

Key bulk water storage trigger	Drought preparedness action (status at December 2017)
70% - Drought readiness	• Collaboration with the SEQ Service Providers to optimise water supply and distribution • Developing detailed drought demand management actions • Working with relevant peak industry bodies to provide information about the drought response and work with these organisations to provide information on the drought response approach to members • Review of leakage management plans • Development of drought roles and responsibilities governance
60% - Drought response	• Gold Coast Desalination Plant (GCDP) readiness, including operational reliability testing • Western Corridor Recycled Water Scheme (WCRWS) re-start plans developed • WCRWS commercial and operational agreements and operating protocols in place • WCRWS restart communications plans in progress • Water transmission license and related documentation in preparation
50% - Medium Level Water Restrictions	• Developing regionally consistent water restriction schedules, including undertaking an economic assessment of the schedules • Collaborating with the Department of Natural Resources Mines and Energy to develop a potential new water restrictions framework.

3.0 Readiness of climate-resilient supply assets

Seqwater has two climate-resilient water supplies – Gold Coast Desalination Plant and Western Corridor Recycled Water Scheme. These assets are operated for drought response and other operational activities. For example, Gold Coast Desalination Plant is operated to meet demand when other local WTPs are off-line for maintenance or planned upgrades.

The readiness of each supply asset to respond to drought triggers was improved during 2017, and additional work will continue into 2018.

Gold Coast Desalination Plant

The GCDP is a key component of the drought response. It is triggered to operate at full capacity for continuous operation when 60% key bulk water storage capacity is reached.

The GCDP operates in 'Hot Standby' and must be able to respond as a contingent supply and provide 33% production capacity within 24 hours and full capacity within 72 hours. To maintain its hot standby state of readiness, the plant operates under a reduced frequency and run time mode. This means the plant runs three times per fortnight with water production ranging from 4ML to 6ML per run depending upon the raw water quality and other conditions. The flexibility of hot standby mode for GCDP was evidenced when GCDP played a significant role providing drinking water supply during the January 2011 flood event, the Australia Day 2013 extreme weather event and more recently during the March 2017 ex-Tropical Cyclone Debbie event.

In addition to emergency event response, the GCDP has also been called upon several times to supplement the Gold Coast water supply during planned temporary closures of the Mudgeeraba and Molendinar WTPs for planned upgrade works. Most recently in March 2017, the desalination plant ramped up its water production while the Mudgeeraba WTP was temporarily shut down for planned maintenance. This was the fourth time since September 2015 that the GCDP has been used to maintain drinking water supply outside of an emergency event.

Testing is undertaken on a regular basis at various production capacities as part of GCDP preparedness. This has been considered prudent, to demonstrate readiness of continuous run during a drought event or for responding to an emergency event requiring operation of GCDP at short notice. This testing includes a plant performance and reliability trial.

Western Corridor Recycled Water Scheme

The Western Corridor Recycled Water Scheme (WCRWS) is also a key component of the drought response and Seqwater's ability to meet the Level of Service Objectives. The WCRWS is triggered to commence recommissioning (which may take up to two years) at the 60% key bulk water storage drought trigger.

Seqwater has completed a program plan for restart and remobilisation of the scheme as a result of extensive collaboration with SEQ service providers, internal and external stakeholders (including government agencies). Seqwater is now better informed about critical path activities, resources costs and timeframes required for restart of the WCRWS which significantly improve our state of readiness, when required.

Having completed the restart plan, Seqwater will undertake further work in 2018 on critical pre-requisite activities including: updating the Recycled Water Management Plan, validation and verification of water quality in conjunction with Queensland Urban Utilities, and work with Department of Natural Resources Mines and Energy on requirements for the transmission licence to account for water released into Wivenhoe Dam.

Seqwater is also working with other interested parties to consider other uses for the recycled water in times outside of drought.

4.0 Projected regional average urban demand

Demand is significantly impacted by climatic conditions, population growth and consumption behaviour changes. The impact of climatic conditions on demand was highlighted in 2017 with demands spiking during the hot dry spells. On average, 2016/17 demand rose by 4.4% compared to 2015/16.

Updated demand assessments carried out during 2017 did not trigger any need to review demand forecasts used for water security.

Demand assessment

Demand projections are assessed annually, based on the financial year, to monitor the performance of the projections for strategic and long-term planning requirements. The annual assessment occurs in collaboration with the SEQ Service Providers from September to October each year.

The 2017 annual demand forecast assessment included a review of key parameters including population projections, water consumption, population profiles, water connection account growth and seasonal variation.

The annual demand forecast assessment considered:

- The Bureau of Meteorology issued a climate outlook in November 2017 with rainfall outlooks remaining neutral due to competing climate drivers. The Bureau of Meteorology indicates a normal to wet year outlook for the remainder of 2017/18.
- The actual 2016/17 annual demand grew by 4.4% from the previous year.
- Return of historical annual water demand growth rate in 2016/17 between 4% to 6% per annum, which compares to the Medium demand outlook, which is built on an approximate 4% annual growth.

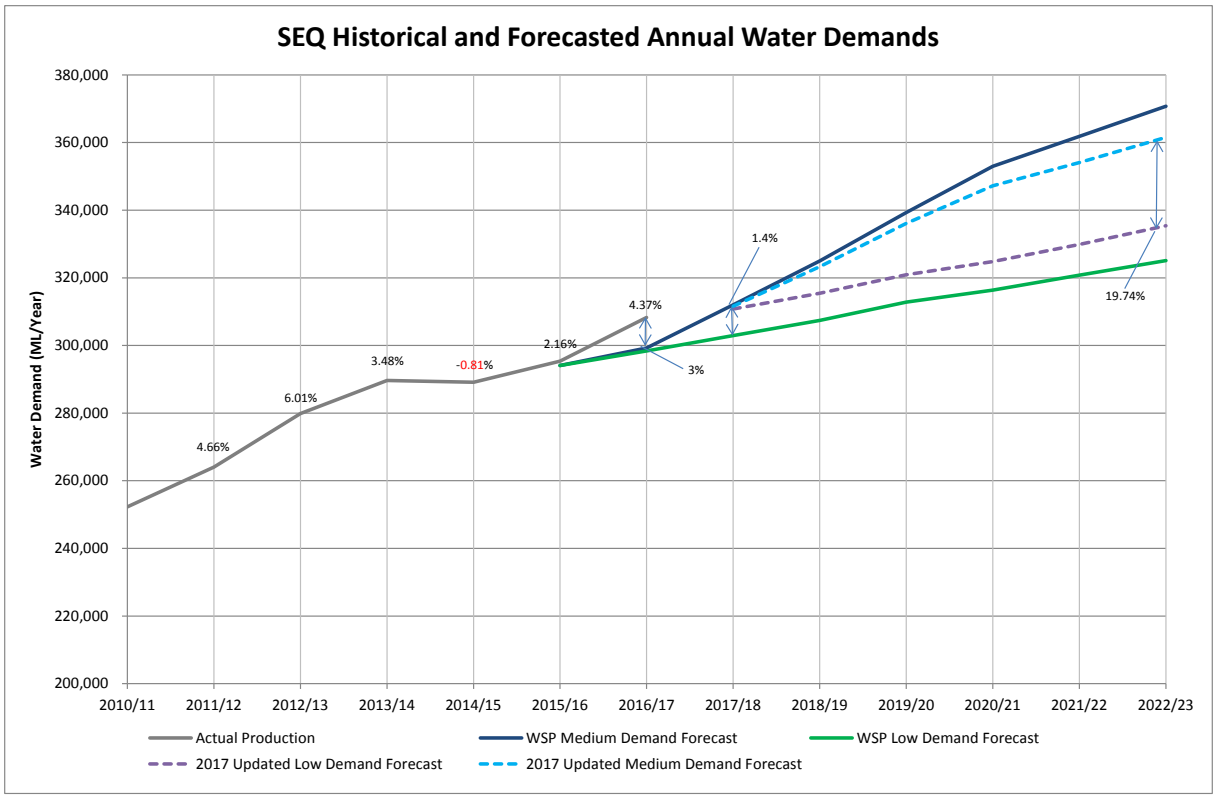


Figure 3: Overview of 2017 annual demand forecast review

The current demand forecast for the remainder of 2017/18 and the next five years is summarised in Figure 3. The 2017 annual demand will be in a closer alignment to the Water Security Program Medium demand projection.

From 2018/19 onward, the 2017 Medium demand forecast is similar to the Water Security Program version 2 medium demand projection (refer to Figure 4).

The 2017 Low demand forecast is about 1.4% higher than the Water Security Program Low demand until 2024/25. From 2024/25 onward, the 2017 Low demand forecast grows at a steady increase up to 16.8% above the Water Security Program Low demand forecast.

The 2017 High demand forecast is consistently less than 3% lower than the Water Security Program High demand forecast across the 30 year planning period.

The comparison of 2017 demands to Water Security Program demands has led Seqwater to the conclusion that the Water Security Program Medium demand projection will be retained for long-term water security planning purposes. Reasons behind this decision include:

- the relative proximity of the Water Security Program Medium demand to the 2017 demand up to year 2023/24
- the known level of uncertainty beyond the year 2031 in regards to Queensland Government Statistician's Office (QGSO) population projection underpinned the divergence in the outer years.

Based on this demand forecasting assessment, the demands in 2016/17 are 3% higher than those projected in the Water Security Program version 2 demands, however still below the 10% threshold for reviewing the Water Security Program demand forecast as detailed in Version 2 of the Water Security Program. Seqwater will continue to closely monitor demand

Updated Low and High demand forecasts will be used in scenario sensitivity testing for the Water Security Program. Updates to the 2017 Low and High demands which are built on QGSO 2015 Edition population projections will align with the whole of Government population growth outlook.

The significant increase (> ±10%) in the long-term demand underpinned by the divergence of the long-term population outlook is the reason behind this decision.

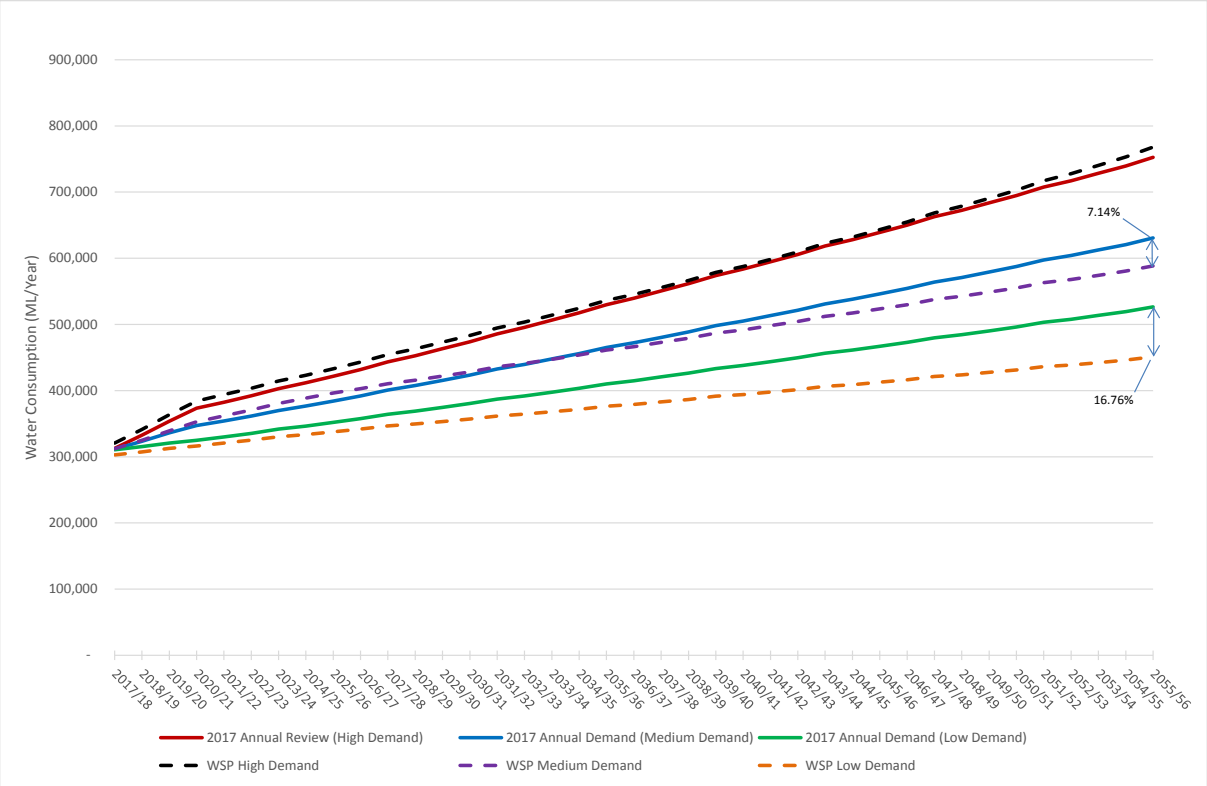


Figure 4: Water Security Program demands compared to 2017 annual assessment demands (excluding Power Station consumption)

Table 2 details the forecast low and medium demand for SEQ from 2018/19 – 2023/24.

Table 2: 2017 Annual Demand Review

Financial Year	Low demand SEQ (ML/Year)	Medium demand SEQ (ML/Year)
2018/19	319,035	326,912
2019/20	324,509	339,706
2020/21	328,403	350,850
2021/22	333,505	357,690
2022/23	339,024	365,169
2023/24	345,411	373,593

Seqwater continues to work with the SEQ Service Providers to understand longer-term demand management options and will encourage policy change where appropriate for long term water efficiencies.

5.0 Assessment of the regional water balance

The regional water balance has not changed from the Water Security Program. The Level of Service yield with the current infrastructure and the version 2 drought response measures was determined to be 440,000 ML/annum.

SEQ off-grid communities continue to be monitored for drought and long-term planning needs. There have been no significant planning changes for the off-grid communities in 2017, hence long-term planning remains consistent with the Water Security Program.

Growth in the Beaudesert area is expected to exceed the capacity of the Beaudesert Water Treatment Plant (WTP) around 2019. Planning work is progressing on a new pipeline connection from Beaudesert to the Water Grid. This new supply will meet demand in the short term. As demand increases, supply will be supplemented by the staged development of a new Wyaralong WTP located at Cedar Grove. Together, these two projects will provide long term water security for the Beaudesert and South Logan area.

The off-grid communities were also impacted by climatic conditions in 2017. Table 3 shows the off-grid communities affected by drought conditions in 2017.

Table 3: Off-grid community 2017 drought response

Off-grid community	Drought Alert level triggered (monitoring and preparedness)	Drought exit
Canungra	30 December 2016	3 January 2017
Dayboro	1 December 2016	10 April 2017
Jimna	7 March 2017 18 September 2017	4 April 2017 10 October 2017
Kenilworth	14 November 2016	12 January 2017

Seqwater continues to monitor drought levels for all off-grid communities and implement drought actions with the SEQ Service Providers as required.

6.0 Drawdown scenarios

On a regional basis, storages dropped to almost 70% of the key bulk water storages in March 2017 and again in September 2017. The key bulk water storages are the 12 major water supply dams in SEQ connected to the water grid. Figure 5 indicates how the key bulk water storage levels increased post the October 2017 rainfall event. The impact on the sub-regional storages is shown in Appendix D.

Figure 5 details the actual drawdown curve for the key bulk water storages, how the system would have responded to Millennium Drought inflows with the current drought response approach (including the Water Grid, Gold Coast Desalination Plant and Western Corridor Recycled Water Scheme) and the Design Drought.

The Design Drought is a modelling-generated drought based on the worst droughts on stochastic record. The Design Drought was developed for the Water Security Program based on data from our stochastic record to define a potential drought worse than the Millennium Drought. Figure 4 shows that all droughts start with declining inflows; it is the severity and duration of the drought that differs. Before October 2017, the key bulk water storage drawdown was on a decline. Recent rains have provided an increase in storage capacity.

Seqwater will continue to closely monitor the situation and respond accordingly based on the adaptive drought response approach.

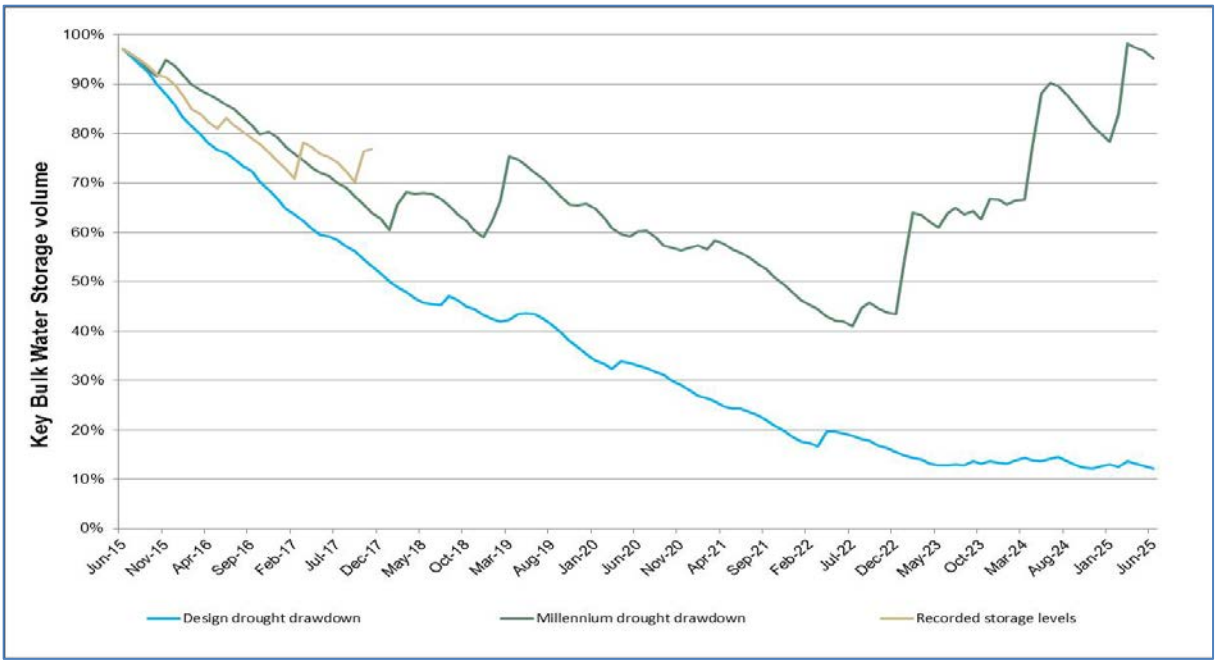


Figure 5: Key bulk water storage drawdowns

Up until October 2017, the majority of SEQ water storages were drawn down. The October 2017 rainfall event resulted in a welcomed increase in all major water storages. Figure 5 above details the drawdown of the key bulk water storages. Appendix D indicates the drawdown of the key individual water supply sources across the region. As noted earlier, the local storages are critical to the water supply for each sub-region. It is important to monitor each storage and operate the system in a way to supplement these storages to meet the demands of the sub-regions.

Appendix A – SEQ bulk water supply system

Seqwater major assets

Legend

- Northern Pipeline Interconnector
- Western Corridor Recycled Water Scheme
- Southern Regional Water Pipeline
- Eastern Pipeline Interconnector
- Network Integration Pipeline
- Other bulk water pipelines connecting the SEQ water grid
- Local government boundary
- Reservoirs
- Water Treatment Plants (WTP) – connected to grid
- Water Treatment Plants (WTP) – off-grid
- Water Treatment Plants (WTP) – other
- Western Corridor Recycled Water Scheme
- Desalination plant

Water Treatment Plants (WTP)

1 Amity Point WTP
2 Atkinson Dam WTP
3 Banksia Beach WTP
4 Beaudesert WTP
5 Boonah Kalbar WTP
6 Borumba Dam WTP
7 Canungra WTP
8 Capalaba WTP
9 Dayboro WTP
10 Dunwich WTP
11 East Bank (Mt Crosby) WTP
12 Enoggera WTP
13 Esk WTP
14 Ewen Maddock WTP
15 Hinze Dam WTP
16 Image Flat WTP
17 Jimna WTP
18 Kenilworth WTP
19 Kilcoy WTP
20 Kirkleagh WTP
21 Kooralbyn WTP
22 Landers Shute WTP
23 Linville WTP
24 Lowood WTP
25 Maroon Dam WTP
26 Molendinar WTP
27 Moogerah Dam WTP
28 Mudgeeraba WTP
29 Noosa WTP
30 North Pine WTP
31 North Stradbroke Island WTP
32 Petrie WTP
33 Point Lookout WTP
34 Rathdowney WTP
35 Somerset Dam (Township) WTP
36 West Bank (Mt Crosby) WTP
37 Wivenhoe Dam WTP

Western Corridor Recycled Water Scheme

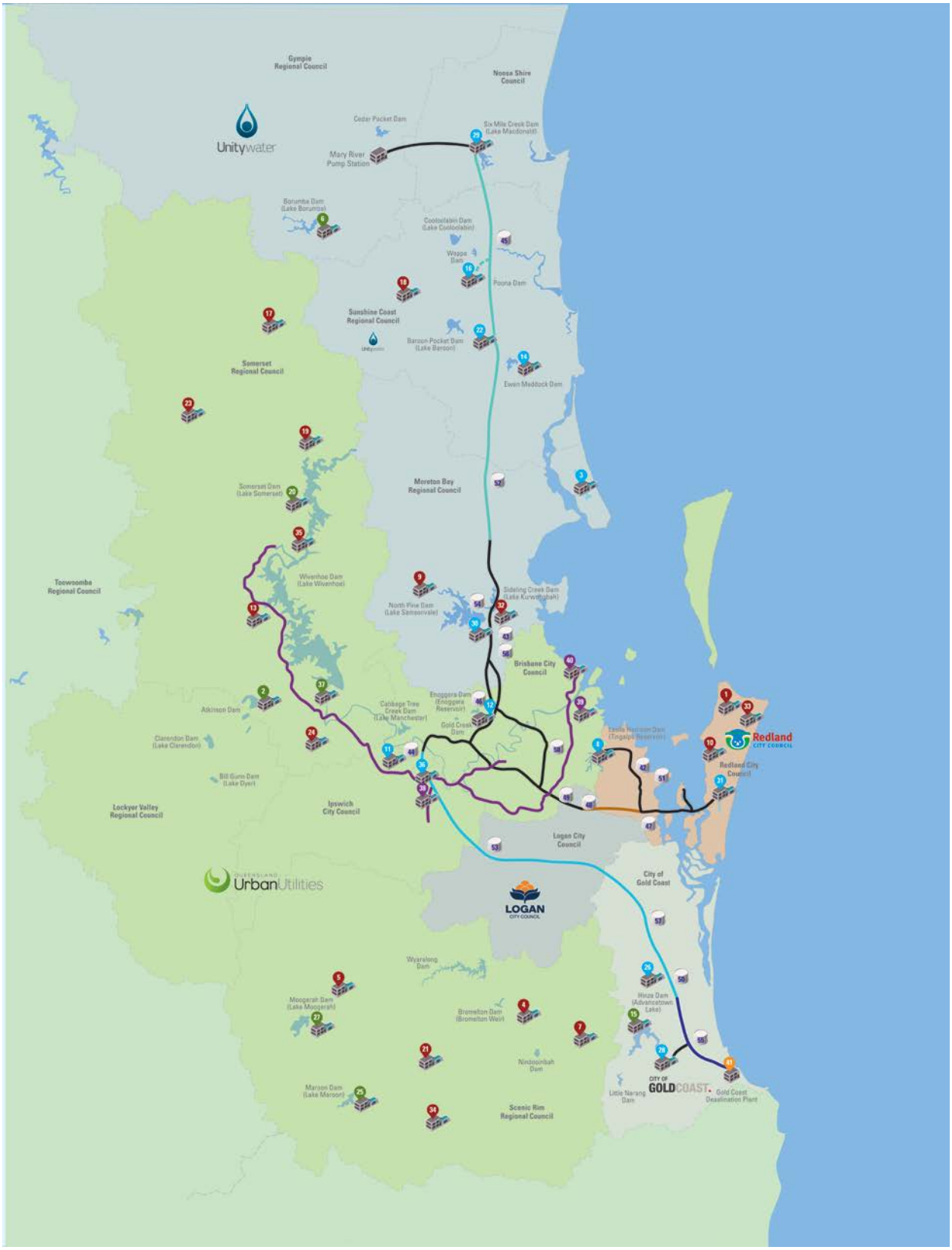
38 Bundamba Advanced Water Treatment Plant (AWTP)
39 Gibson Island AWTP
40 Luggage Point AWTP

Desalination Plant

41 Gold Coast Desalination Plant

Reservoirs

42 Alexandra Hills Reservoirs
43 Aspley Reservoir
44 Camerons Hill Reservoir
45 Ferntree Reservoir
46 Green Hill Reservoirs
47 Heinemann Road Reservoirs
48 Kimberley Park Reservoirs
49 Kuraby Reservoir
50 Molendinar Reservoir
51 Mt Cotton Reservoir
52 Narangba Reservoirs
53 North Beaudesert Reservoirs
54 North Pine Reservoirs
55 Robina Reservoir
56 Sparkes Hill Reservoirs
57 Stapylton Reservoir
58 Wellers Hill Reservoirs


Gympie Regional Council
Noosa Shire Council
Unitywater
Cedar Pocket Dam
Six Mile Creek Dam (Lake Macdonald)
Mary River Pump Station
Borumba Dam (Lake Borumba)
Cooloolabin Dam (Lake Cooloolabin)
Wappa Dam
Poona Dam
Sunshine Coast Regional Council
Baroon Pocket Dam (Lake Baroon)
Ewen Maddock Dam
Somerset Regional Council
Somerset Dam (Lake Somerset)
Moreton Bay Regional Council
Wivenhoe Dam (Lake Wivenhoe)
North Pine Dam (Lake Samsonvale)
Sideling Creek Dam (Lake Kurwongbah)
Toowoomba Regional Council
Brisbane City Council
Atkinson Dam
Cabbage Tree Creek Dam (Lake Manchester)
Enoggera Dam (Enoggera Reservoir)
Gold Creek Dam
Clarendon Dam (Lake Clarendon)
Bill Gunn Dam (Lake Dyer)
Redland City Council
Lockyer Valley Regional Council
Ipswich City Council
Logan City Council
City of Gold Coast
Queensland Urban Utilities
LOGAN CITY COUNCIL
Wyaralong Dam
Moogerah Dam (Lake Moogerah)
Bromelton Dam (Bromelton Weir)
Hinze Dam (Advancetown Lake)
Nindooinbah Dam
Maroon Dam (Lake Maroon)
Scenic Rim Regional Council
Little Nerang Dam
CITY OF GOLD COAST
Gold Coast Desalination Plant

Appendix B – SEQ bulk water supply sub-regions

Although the region is interconnected, the Water Grid is operated to a large extent at a sub-regional level. This report discusses events on a sub-regional basis. Each of the sub-regions – northern, central, eastern and southern – is centred on a specific water storage, with the means to balance cost effectiveness and water security. The sub-regions are defined below and shown in Figure B-1.

- Northern sub-region
  Bulk water supply assets from Noosa to North Pine WTP; interface with the central sub-region.

- Central sub-region
  Areas supplied by Wivenhoe and Somerset dams via the Mt Crosby WTPs (including Brisbane, Ipswich, Beaudesert and Logan).

- Eastern sub-region
  Assets from the transfer interface between the central sub-region through to Capalaba and North Stradbroke Island WTP.

- Southern sub-region
  Encompasses the Gold Coast supply area and interfaces with the central sub-region.

With interconnection of the water supply systems, the total yield of the water grid is greater than the yield of individual systems operating independently. When one supply source is being depleted, the water grid can be operated to allow other supply sources to be substituted, resulting in a higher overall yield.

This means that the grid can meet growing demand for considerably longer, delaying the need for major investment in additional water supply infrastructure.

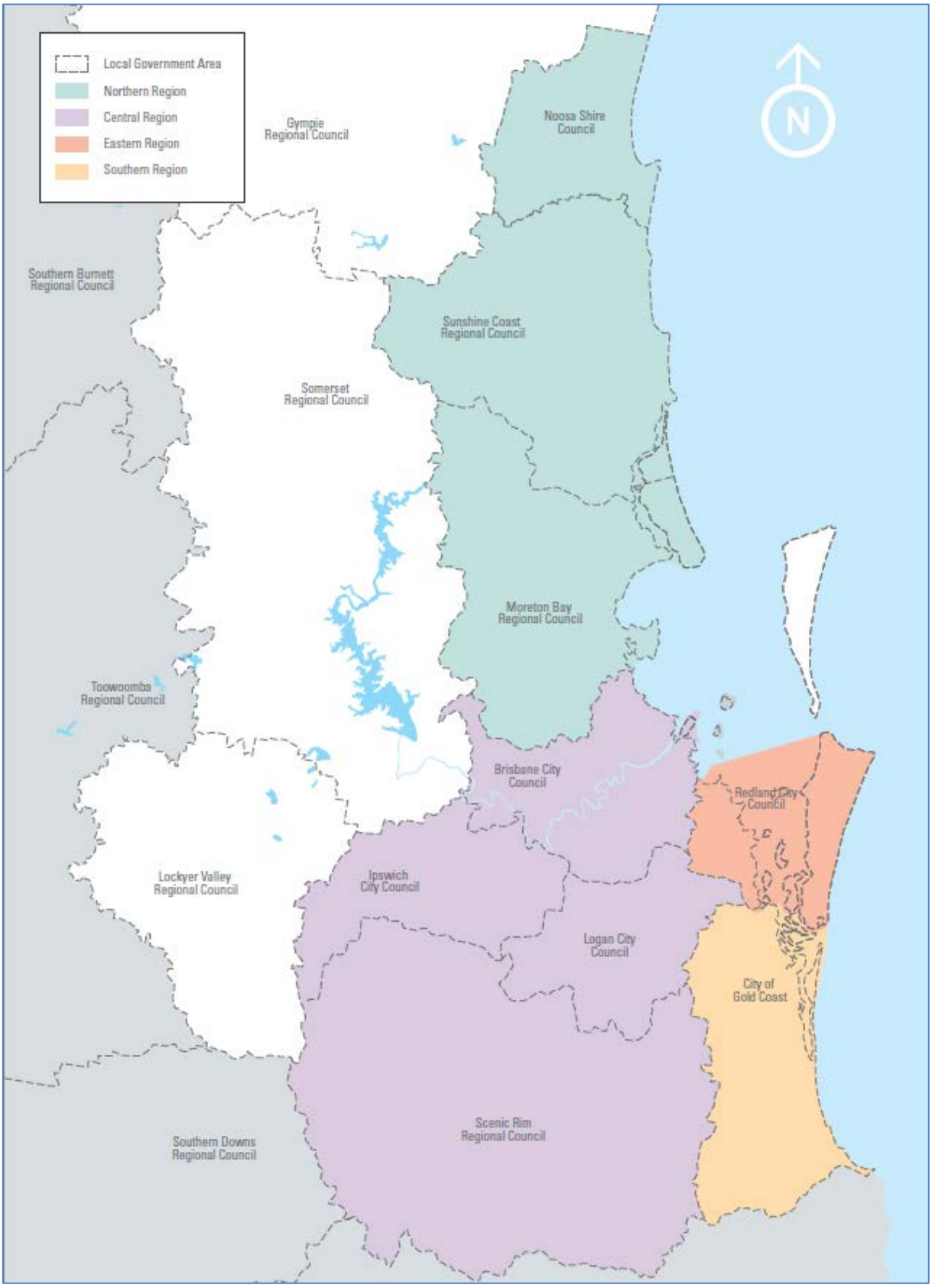


Figure B-1: Sub-regions of the SEQ Water Grid

While the water grid is able to move water around SEQ, each sub-region is reliant on its local water storages to maintain water supply during extreme droughts. This was highlighted during the recent extended dry spell in the northern sub-region. Further information on the bulk water supply system, including the sub-regions, can be found in the Water Security Program, beginning on page 51.

Appendix C – Drought readiness projects

Program Element	Objective
Drought Asset Planning and Infrastructure delivery Projects	
Project 1 - Aspley Water Quality Management facility (WQMF)	Maintain 3mg/L chlorine residual at flows up to 125ML/day
Project 2 – Sparkes Hill to Aspley Pipeline Capacity Upgrade	Increase northerly flow to 125ML/day
Project 3 – Byrne's Rd Pressure Sustaining Valve (PSV)	Enable 100% northerly flow from North Pine WTP
Project 4 – Aspley to Narangba Pipeline Capacity Upgrade	Increase flows north past Byrne's Road (from Central
Project 5 – Ewen Maddock WTP Restart	Ability to Operate Ewen Maddock WTP at 20ML/day – Complete
Project 6 – Kurwongbah Water Utilisation	Enable access to water from Lake Kurwongbah post Petrie WTP decommissioning
Project 7a – WCRWS Esk Kilcoy Rd Landslip - Pipeline Repairs.	Enable use of the WCRWS pipeline within an acceptable risk profile
Project 7b – WCRWS Esk Kilcoy Rd Landslip – Landslip Stabilisation	Enable use of the WCRWS pipeline within an acceptable risk profile
Project 8 – Mudgeeraba Hydraulic Constraint	Restore Hydraulic Capacity of Mudgeeraba WTP to 105ML/day
Project 9 – Maroochy Sub – Zone Alternative Supply	Increase capacity to supply from the Grid to Maroochy sub–zone (20ML/day) and the Caloundra sub-zone (10ML/day)
Project 10 – NPI Pump Station Reliability Project	Restore drought operating strategy within 7 days following asset breakdown
Project 11 – Eudlo Flow Meter and Control Valve	Improve control of flows to the Maroochy sub-zone so that supply from Baroon Pocket Dam can be minimised.
Project 12 – Extended Landers Shute Shut Down	Determine feasibility and benefit of enabling extended shut downs of Landers Shute WTP
Project 13 – northern Pipeline Interconnector Monitoring and Control Systems upgrade	Upgrade to improve control and reliability

Appendix D – Sub-regional storage drawdowns

Each of the graphs below (Figures D-1 to D-5) show for each key storage:

- The recorded (actual observed) drawdown from June 2015 to October 2017
- How the system would have responded to Millennium Drought inflows with the current drought response approach (including the Water Grid, Gold Coast Desalination Plant and Western Corridor Recycled Water Scheme) for that storage/s
- The Design Drought drawdown. The Design Drought was developed based on data from our stochastic record to define a potential drought worse than the Millennium Drought for that storage/s.

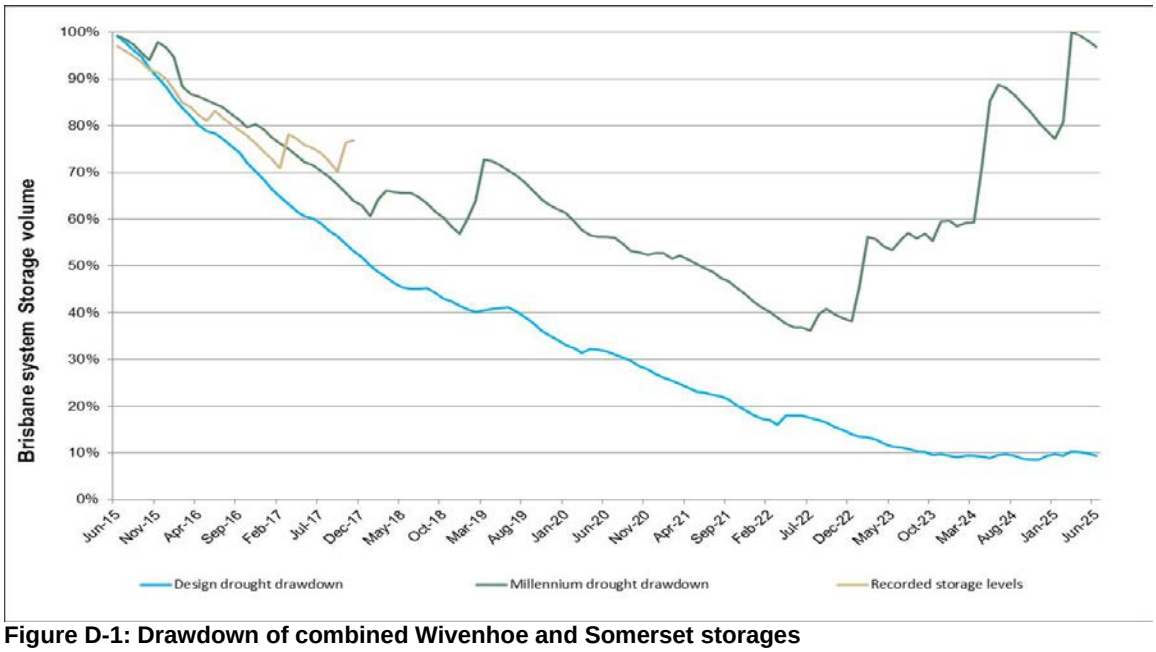


Figure D-1: Drawdown of combined Wivenhoe and Somerset storages

Figure D-1 indicates that the combined storage of Wivenhoe and Somerset dams, representing 70.3% of the key bulk water storage capacity at full supply, was showing a decline, at a rate worse than if the same inflows experienced during the Millennium Drought occurred (before the October 2017 rainfall). This highlights the region's high level of climate variability that Seqwater must plan for in its water supply system and future options.

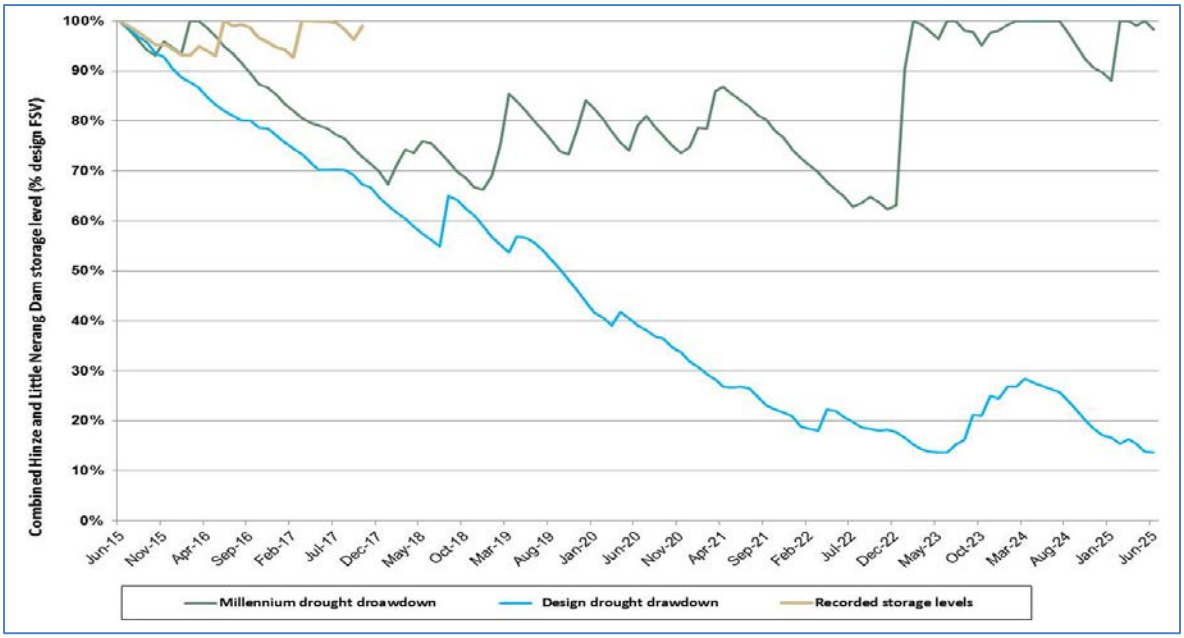


Figure D-2: Hinze dam drawdown

Figure D-2 shows that Hinze Dam has received significant inflows resulting in the recorded drawdown being substantially above the Millennium and Design drought drawdowns.

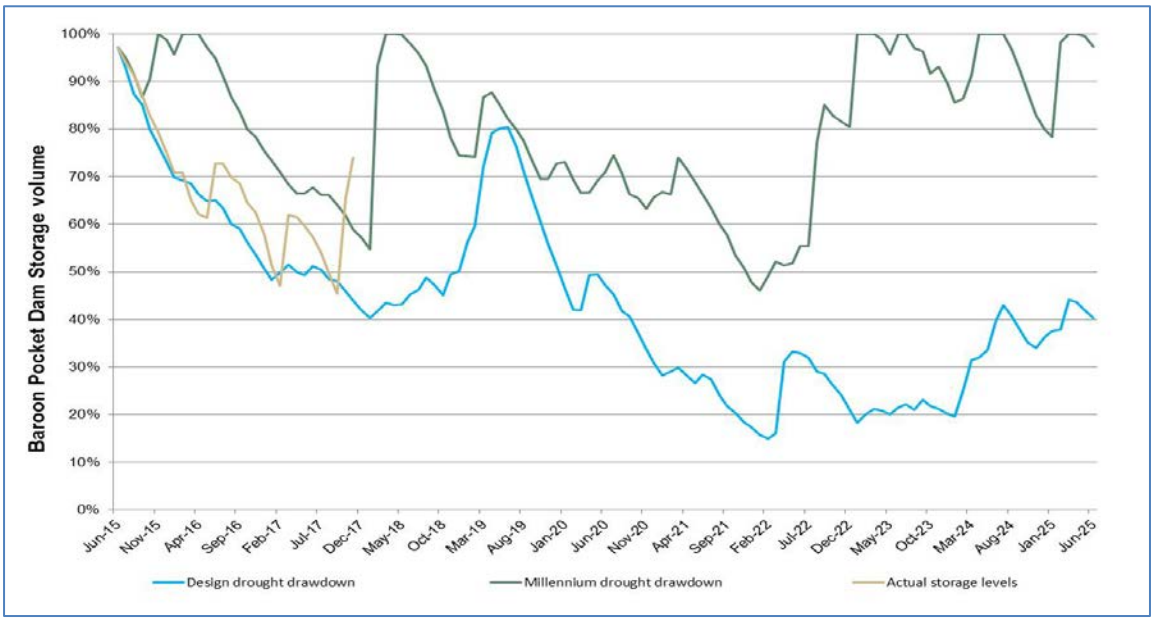


Figure D-3: Baroon Pocket drawdown

Figure D-3 indicates that Baroon Pocket Dam was drawing down at a rate greater than the Millennium Drought although it has now received inflows to reach above 70% capacity. The northern sub-region has experienced a lack of seasonal rainfall, impacting operating conditions. The operating conditions have been reviewed and changed for future operation. More detail on this situation in the northern sub-region is provided below.

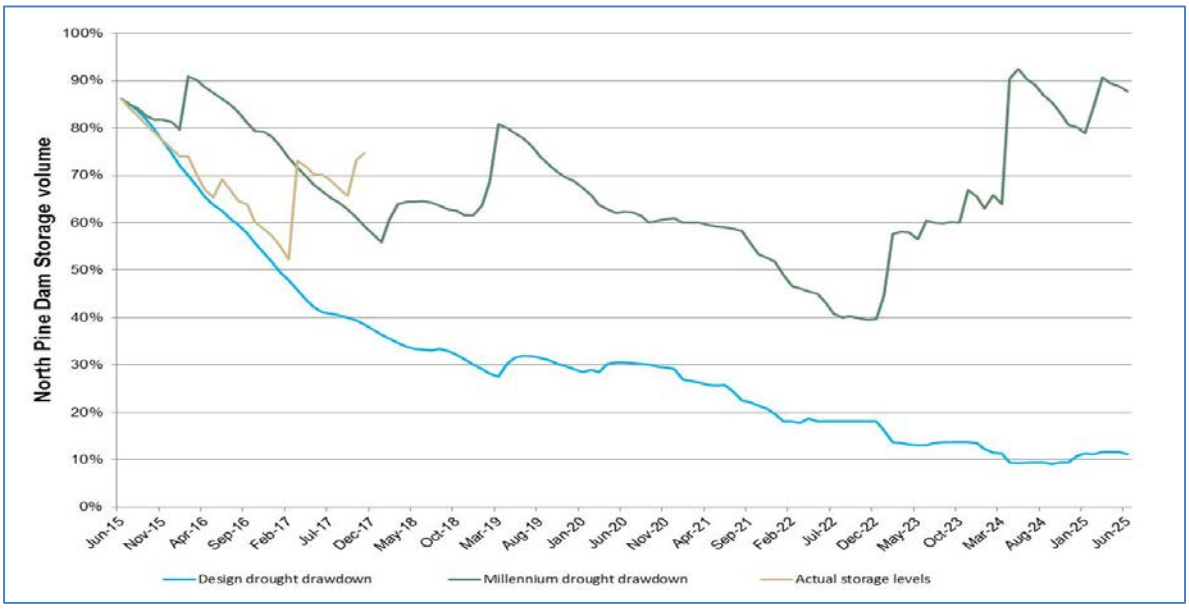


Figure D-4: Drawdown of North Pine Dam

Figure D-4 shows that North Pine Dam was on a significant decline before ex-Tropical Cyclone Debbie, and was again replenished with the October 2017 rain. North Pine is a critical asset for supply to the northern sub-region and Seqwater will continue to monitor and manage this storage for long term water security.

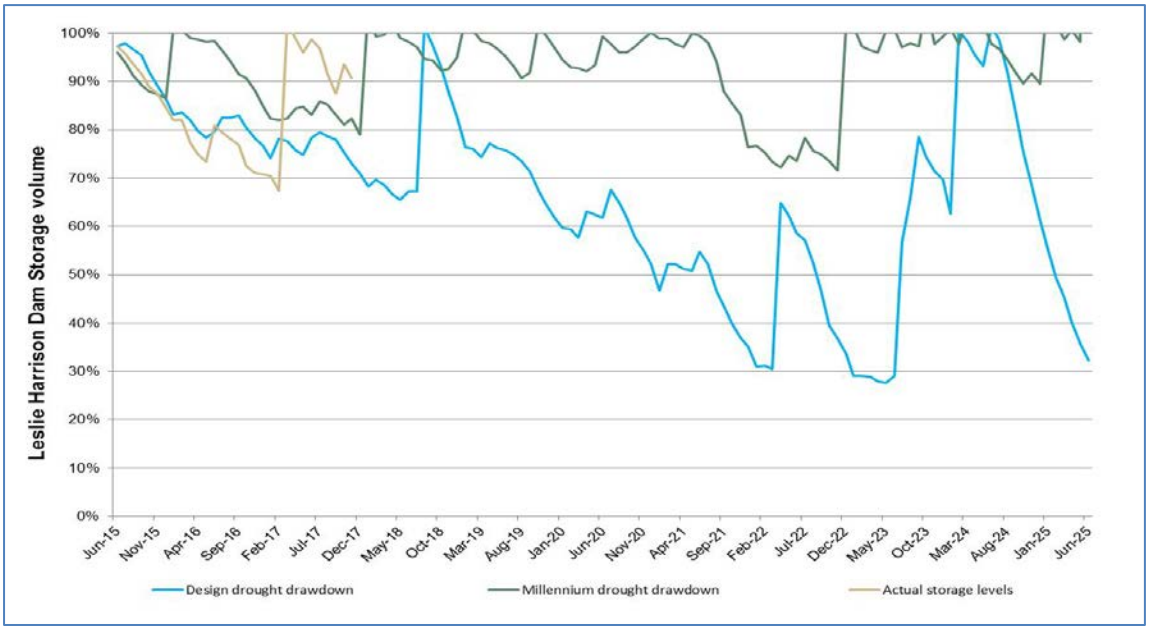


Figure D-5: Eastern sub-region drawdown

Figure D-5 also shows a significant drawdown before ex-Tropical Cyclone Debbie and a further replenishment post the October rains. The levels are based on the temporary full supply level.