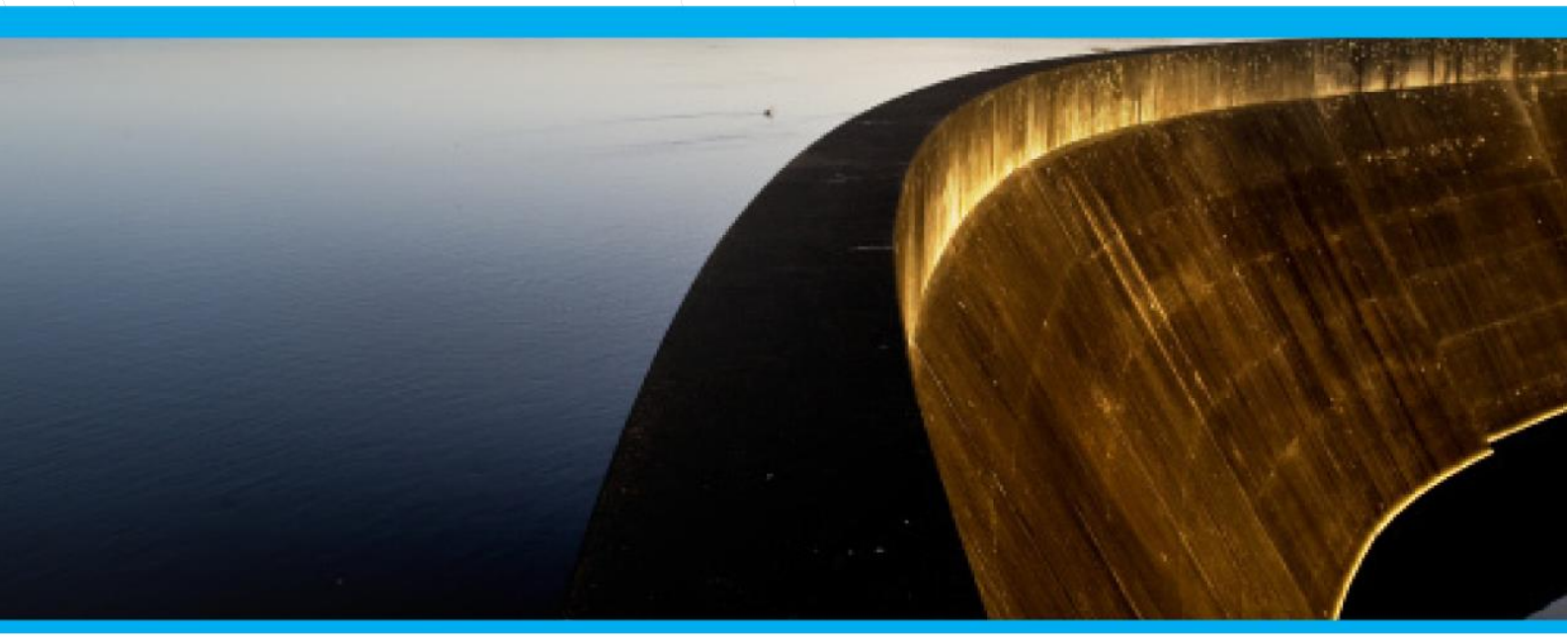
2018 Water Security Program Annual report

December 2018



seqwater
WATER FOR LIFE

SOURCE STORE SUPPLY

Document Control

Reviewer			Approved for issue			
Date	Name	Signature	Date	Name	Position	Signature

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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 2018 report assesses changes in water security compared to version 2 of the Water Security Program (released March 2017).

Highlights

The highlights for 2018 include:

- confirmation that projected demands, of 185 L/p/d and 100 L/p/d, for residential and non-residential demands respectively, are still current
- changes to the Water Grid operating philosophy to maintain higher water security for Baroon Pocket Dam by commencing transfers from the central sub-region from a higher storage level
- continuation of significant capital and operational works to further increase the Water Grid's capacity to supply water into the Northern sub-region
- ongoing preparatory work to achieve a state of readiness for drought response triggers when required
- restart of one treatment train for industrial use at Luggage Point Advanced Water Treatment Plant, a significant Western Corridor Recycled Water Scheme asset, boosting drought preparedness
- significant progress with the SEQ Service Providers on collaborative drought response planning and governance
- significant progress on more detailed planning for regional long-term and contingency supply options in the Northern sub-region as input to the next version of the Water Security Program
- commencement of the Water Future Program, a 3-year education and engagement program, with the goal of creating a water-wise SEQ.

Drought preparedness

Climate variability presents a challenge for long-term water supply and drought planning. South East Queensland has experienced and will continue to experience a climate of extremes. Seqwater must be prepared and adaptive in our planning to meet the needs of our growing community in this climate of extremes.

The Water Security Program contains a Drought Response Plan, with triggers for actions when the combined level of the region's key drinking water supplies reach certain levels. Seqwater has significantly increased its drought preparedness to implement this plan in 2018.

The last two years have highlighted the potential for droughts to impact a sub-region of SEQ whilst storages in other sub-regions are overflowing. This will be addressed in the next version of the Water Security Program.

Other matters

Major changes to the bulk water supply system in 2018

Throughout 2018 Seqwater continued to deliver around $20M in capital works to improve the capacity of the Water Grid to transfer water into the Northern sub-region. These programs will continue to be implemented into 2019.

Changes to risks to readiness of manufactured water assets in 2018

Seqwater has undertaken risk mitigation activities to provide surety that the full Western Corridor Recycled Water Scheme can restart in accordance with the Drought Response Plan and deliver purified recycled water to Lake Wivenhoe within a 2-year timeframe. This included the reinstatement of a single reverse osmosis train at the Luggage Point Advanced Water Treatment Plant (23.3ML/day, total Luggage Point Advanced Water Treatment Plant capacity 70ML/day) and associated pipeline assets from a care and maintenance state. This capacity is now available for industrial use and to supply to power stations. The purified recycled water produced meets all water quality parameters within the Australian Drinking Water Guidelines.

Projected regional average urban demand

Water demand is influenced by climatic conditions, population growth and consumption behaviour. Water demand this year rose slightly and is reflective of the climatic conditions at the time. The demands are consistent with long-term historical trends, influences observed this year and the assumptions made about medium demand projections in the Water Security Program.

Assessment of the regional water balance

Commencing in 2017, Seqwater has continued to implement capital works and a change to the grid operating mode to allow for more volume of water to be transferred to the Northern sub-region of SEQ. Whilst the main purpose of this was to improve the water security of Sunshine Coast region it also means that there is an overall yield increase for SEQ. This has resulted in a change to the Level of Service (LOS) yield of 10,000ML/annum to a total of 505,000 ML/annum. This compares to the prior yield of 495,000 ML/annum specified in version 2 of the Water Security Program, inclusive of planned minor capacity augmentations identified at that time.

Drawdown scenarios

The region's key bulk water storage declined to 75% capacity in February and October 2018.

Sub-regionally the drawdowns varied during 2018 demonstrating the significant impact the level for Lake Wivenhoe has on the key bulk water storage capacity. Post March 2018 many of the key bulk water storages were close to full supply level (noting some were temporary full supply levels). Wivenhoe Dam did not exceed 78% capacity and fell in December to 67%. Given the other main storages are close to full capacity and the key bulk water storage level is at 75.3% (12 December 2018), without good inflows into the Somerset-Wivenhoe system the central sub-regional storage level could drive a region-wide drought response. This contrasts with 2017 when the northern sub-regional storages were low, yet the key bulk water storage capacity remained high, not triggering a region-wide drought response.

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 as detailed in the Water Security Program.

The purpose of this report is to provide an update on water security planning and implementation during the 2018 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 in 2018

During 2017 infrastructure and operational changes were made to the bulk water supply system to adaptively respond to the climatic conditions and resulting declining water storages in the Northern sub-region. Implementation of these changes have continued in 2018. The changes improve security of supply to the Northern sub-region by improving supply transfers from Wivenhoe and North Pine Dam to the North to support the Sunshine Coast.

Change in Water Grid operations

During 2017 the Northern sub-region showed its vulnerability to drought conditions. As a result, Seqwater initiated changes, which have continued in 2018, to both infrastructure capacity and operating philosophy to improve capability to protect the Northern sub-region during extended drought conditions. The main actions undertaken to improve capability to protect the Northern sub-region include:

- Ewen Maddock water treatment plant (WTP) has been recommissioned, and will continue to operate as a base load plant. This will reduce demand on Baroon Pocket Dam and will provide additional capacity to meet peak demands.
- The sub-regional operation trigger to protect Baroon Pocket Dam by minimising production from Landers Shute WTP has been raised by 30%. This is achieved by maximising transfers into its normal supply area from other sources, primarily via the Northern Pipeline Interconnector 1 (NPI1) and Northern Pipeline Interconnector 2 (NPI2). The extent to which production from Landers Shute WTP can be minimised is constrained by the treatment

process, limited connectivity from the NPI to the Landers Shute supply zones, capacity limits of the NPI, water security of the other northern sources and capacity to transfer water from the central sub-region past North Pine WTP to the northern sub-region.

- Approximately $20 million of capital projects (Appendix B) have commenced to provide greater capability to minimise production from Landers Shute WTP. These projects primarily improve connectivity from the NPI to the Landers Shute supply zones and transfer capacity from the central sub-region to the northern sub-region.
- Planning work has continued to investigate appropriate drought contingency and long-term water supply solutions for the Northern sub-region. This work will also further consider whether the Baroon Pocket protection trigger can be optimised further.

Appendix C details the revised operational triggers for the Northern sub-region.

Drought preparedness

The Water Security Program, through the Drought Response Plan, details an adaptive drought response approach (Figure 1). Seqwater is preparing to follow this drought response approach in an adaptive manner cognisant of the climatic conditions, water demand, operation of the system and other key influential factors.

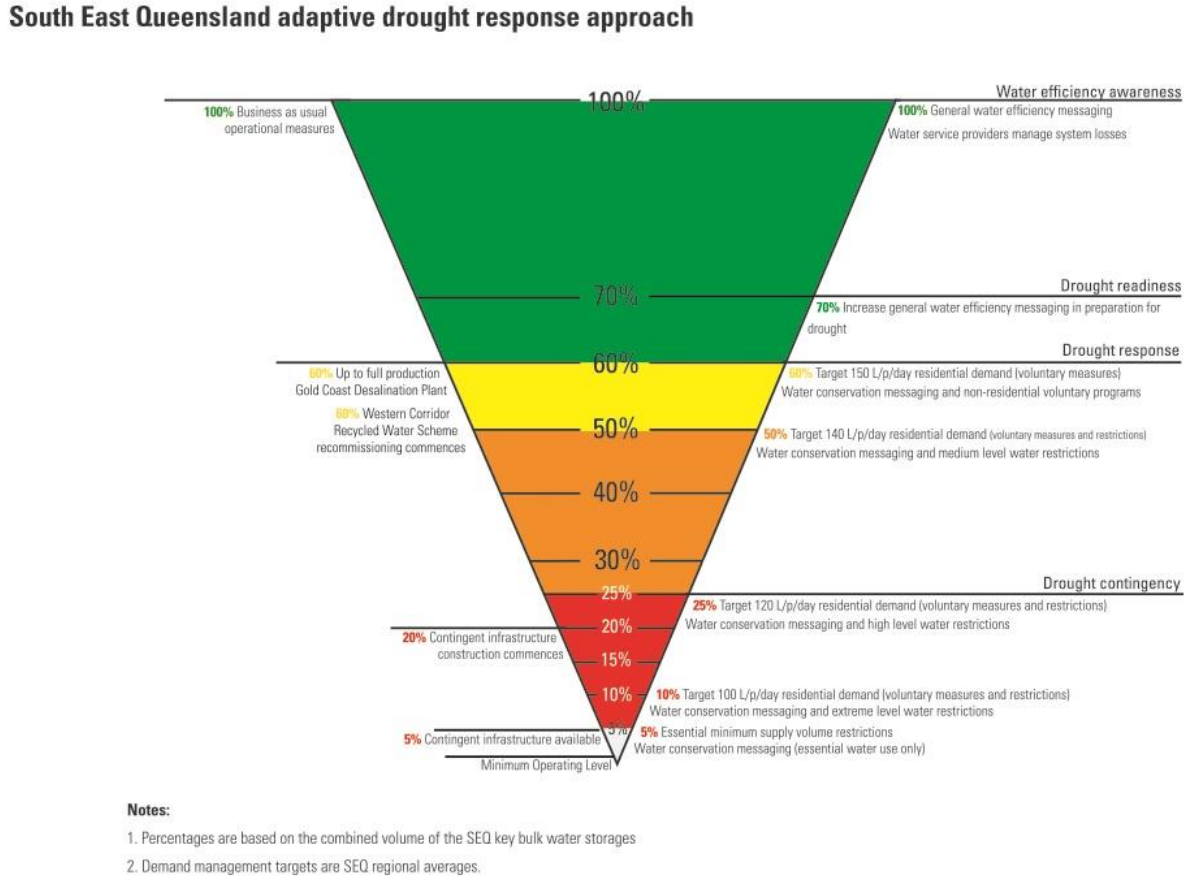

Figure 1: Drought response approach

Seqwater has continued drought preparatory work in 2018 to ensure the drought response program can be implemented, when required. Table 1 provides a summary of the drought

response actions for the earlier triggers (70% to 50%). Seqwater is working closely with the SEQ Service Providers and the Queensland Government on drought related projects.

Key bulk water storage (KBWS) trigger	Drought preparedness action (status at December 2018)
70% - Drought readiness	• Collaboration with the SEQ Service Providers to optimise supply and distribution • Developed detailed drought demand management actions • Simulation event completed to understand response issues and improve drought response implementation • Working with key stakeholders for drought readiness • Finalisation of drought roles and responsibilities governance for Seqwater and the SEQ Service Providers • Review Western Corridor Recycled Water Scheme (WCRWS) re-start plans
60% - Drought response	• Gold Coast Desalination Plant (GCDP) full production • WCRWS readiness including source and supply agreements, restart of one train at Luggage Point Advanced Water Treatment Plant • WCRWS commercial and operational agreements and operating protocols in progress • WCRWS restart communications plans in progress • WCRWS commences recommissioning (approx. two-year duration) • WCRWS Water transmission license and related documentation in progress
50% - Medium Level Water Restrictions	• Collaboratively drafted regionally consistent water restriction schedules with the SEQ Service Providers • Collaborating with the Department of Natural Resources Mines and Energy to progress new water restrictions framework which delivers efficiencies.

Table 1: Drought response actions (KBWS from 70% - 50%)

3.0 Readiness of climate-resilient supply assets

Seqwater has two climate-resilient water supplies – Gold Coast Desalination Plant (GCDP) and Western Corridor Recycled Water Scheme (WCRWS). These assets are operated differently based on the drought response approach and other operational activities. For example, GCDP is operated to meet demand when other local WTPs are off-line for maintenance or planned upgrades, and during severe weather events, and WCRWS is operated to meet demands during drought.

The readiness of each supply asset to respond to drought triggers was improved during 2018, and additional work will continue into 2019. There has been no change to the risk readiness of these assets.

Gold Coast Desalination Plant (GCDP)

The GCDP is a key component of the drought response and is triggered to operate at up to full capacity and for continuous operation when 60% key bulk water storage (KBWS) 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 typically 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 and the Australia Day 2013 extreme weather event and during the March 2017 ex-Tropical Cyclone Debbie event.

In addition to emergency event response, the GCDP was used in 2018 to supplement the Gold Coast water supply during planned temporary closures of the Mudgeeraba, Molendinar and Mt Crosby water treatment plants for planned upgrade works. GCDP is likely to be required to meet peak summer demands as early as 2020.

Asset capability testing is undertaken on a regular basis at various production capacities as part of GCDP preparedness. This is 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 ongoing testing includes a plant performance and reliability trial. This testing results in operational improvements which provide greater readiness for drought response.

Western Corridor Recycled Water Scheme (WCRWS)

The WCRWS is also a key component of the drought response and is triggered to commence recommissioning (which may take up to two years) at the 60% KBWS drought trigger.

Seqwater has completed a program plan for restart and remobilisation of the scheme following extensive collaboration with SEQ service providers and 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.

Seqwater has undertaken risk mitigation activities to develop surety that the Western Corridor Recycled Water Scheme can restart with the two-year timeframe and augment to Lake Wivenhoe. This has been successfully demonstrated at Luggage Point Advanced Water Treatment Plant by the restart of a single reverse osmosis train and associated pipeline network that was in a decommissioned state. This single train provides approximately one third of the Luggage Point plant's capacity which is now available for industrial use (23.3ML/day, total plant capacity 70ML/day). The purified recycled water produced meets all water quality parameters within the Australian Drinking Water Guidelines.

Having completed the restart plan, Seqwater has undertaken further work in 2018 on critical pre-requisite activities including: updating the Recycled Water Management Plan and the development/ implementation of validation and verification 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.

To enable supply to industrial customers and power stations, Seqwater has worked with the Department of Natural Resources Mines and Energy and reinstated the previously suspended Recycled Water Management Plan.

Seqwater has also continued working with interested parties to consider other uses for the WCRWS water in times outside of drought.

As part of the Water Future Program, Seqwater is also educating key stakeholders and the community about the importance of purified recycled water as a climate-resilient water source for SEQ.

4.0 Projected regional average urban demand

Demand is significantly impacted by climatic conditions, population growth and consumption behaviour changes. Consequently, the projected regional average urban demand must be assessed annually to understand changes to the forecast demand.

This section outlines:

- Key elements of the demand assessment and the outcomes
- Annual demand forecast assessment - 2018
- Off-grid community demand projections review.

The annual demand forecast assessment has shown that the 2017/18 actual water consumption was 1.25% above the Water Security Program V2 forecasted medium (planning) demand, however due to the small nature of the change has not triggered a detailed review of the demand forecast.

The per capita demand forecasts (expressed as litres per person per day) for residential (185 L/p/d) and non-residential demand (100 L/p/d), equalling 285 L/p/d total demand for the SEQ region over the next 30 years, has not changed from the Water Security Program.

Demand assessment

To understand the emerging water consumption trend, the annual demand assessment includes the comparison of changes across the three core demand drivers: climatic conditions, population and consumption behaviour across various residential cohorts and non-residential sectors. The following sub-sections provide the comparison of 2017 and 2016 calendar year actual consumption. Note the full 2018 calendar year demand data (based on SEQ Service Provider account data) will not be available for review until early 2019.

Climatic Conditions

The impact of climatic conditions on demand is highlighted when demands spike during the hot dry spells. Climatic conditions predominantly impact short term demand behaviour.. Climatic conditions have limited impact on the longer-term demand profile that underpins

Seqwater's water supply security program. This sub-section provides a detailed overview of the climatic conditions over the 2017 year and their impact on demand.

The Bureau of Meteorology (BOM) annual climate information indicated that 2017 annual SEQ rainfall was below average for the second consecutive year.

- Total average SEQ rainfall was 945mm, which is less than the mean annual rainfall of 1,056mm.
- Rainfall was below average for most of the year, except for March (ex-tropical cyclone Debbie) and above-average rainfall in August–September 2017.

Most of SEQ experienced above average mean temperature except for April and November 2017 where the mean temperatures were below average. The highest mean temperature on record was observed over the months of January to March 2017.

With below average rainfall and above average mean temperature for much of the year, there was an upward pressure on per capita water consumption. This would have contributed to annual water demand growth.

An analysis of the annual rainfall distribution across some of the SEQ key water storages (raw data from BOM) showed there was significant variance between 2016/17 and 2017/18 rainfall. For example, Hinze Dam locality 2016/17 rainfall was reasonably high, Baroon Pocket Dam locality 2016/17 rainfall was reasonably low. Across most of SEQ 2017/18 would best be classified as a normal weather year from a rainfall observation perspective.

Population Growth

Seqwater uses the Queensland Government Statistician's Office (QGSO) population profiles as a base input to annual demand for SEQ that is used for the Water Security Program, annual budgeting and bulk water pricing. The population forecast profiles are ground-truthed with the most recently available SEQ residential water account growth information (sourced from the SEQ Service Providers). The QGSO population forecast profiles are used as a key base input as they represent a whole of Government view on future SEQ population growth. This approach ensures alignment with planning for infrastructure and services at the Local Government Area (LGA) levels.

The population projections used in the Water Security Program demand forecast adopted QGSO recommendations comprising a hybrid of 2013 and 2011 edition population projections. The forecast growth was ground-truthed by analysing the growth of actual SEQ residential accounts.

Since the development of Water Security Program demand forecast, QGSO released an updated version of population projections in April 2016, namely the 2015 edition population projections. The QGSO 2015 Edition Medium Series population, shown in Figure 2, is approximately 1.1% below at the start (July 2016) and 3.7% above at the end of the 30-year projection period (July 2046), when compared to the Water Security Program medium population projection. Similar analyses were conducted for the Water Security Program low and high population projections and both showed close alignment between the projections until at least 2029.

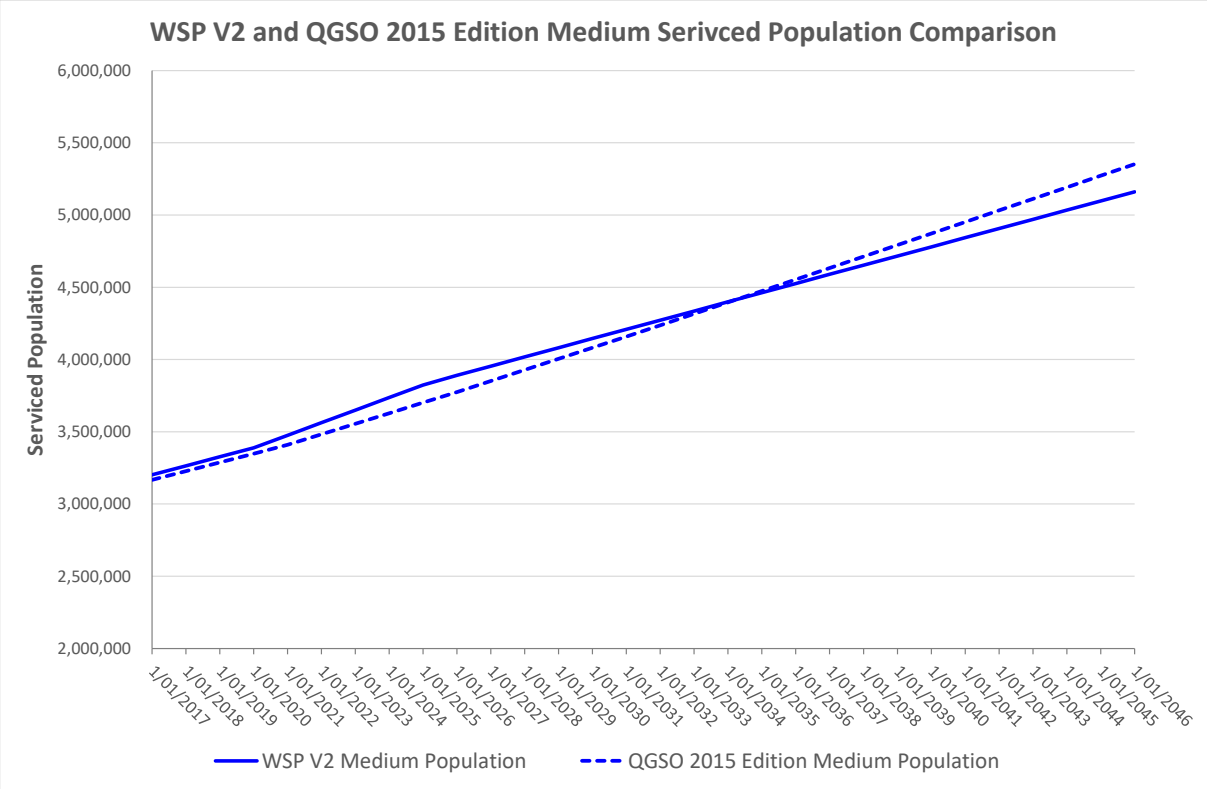

Figure 2: Water Security Program version 2 medium population projection compared to the QGSO 2015 edition medium population projection

QGSO is expected to release its most recent updated population forecast profile (2018 series) to Seqwater in December 2018. The profile series will be evaluated to understand the impact and appropriateness of use by Seqwater.

Consumption Behaviour

The water consumption behaviour assessment was completed using 2017 calendar billing information provided by the SEQ Service Providers. The assessment produces information that is used to formulate and update Seqwater's most likely demand forecast profile.

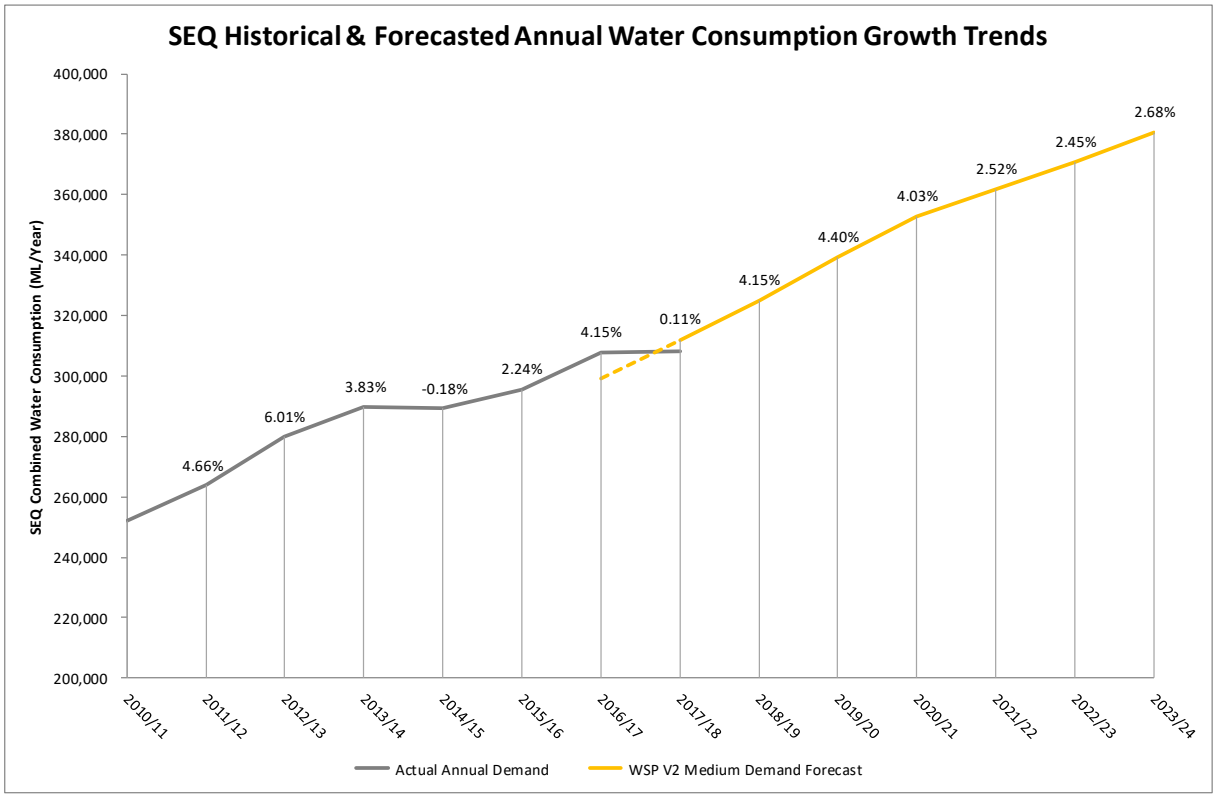

Figure 3: SEQ historical and WSP V2 water demand trend.

Longer term historical water usage

Figure 3 shows a historical annual water consumption growth trend of around 3% per annum up to the end of 2013/14. However, the annual water consumption growth rate significantly declined in 2014/15. This decline in growth continued in the first half of 2015/16. Further investigation had found the decline was largely due to the lower than expected population growth driven by a lower than expected international and interstate migration rate.

Recent water usage

Total water usage (based on production data)
Total water usage has marginally increased by 0.11% from 2016/2017 financial year to 2017/18. Being a total increase of 340 ML. Residential demand increased and non-residential demand decreased (see below).

Year to date annual demand growth as of October 2018 has fallen slightly below expectation by 1.23% (refer to Figure 6). It is possible that the population growth has not been largely affected. Therefore, the decline in year to date 2018 growth appears to be driven by variation in water consumption. It is not known at this early stage if this is a longer-term impact or a short-term temporal change in water consumption growth. Analysis of future SEQ Service Provider data will be conducted to ascertain if growth is being affected by any specific sectors.

Total residential water usage (based on the most recent retail billing data available)
Total residential demand increased by 2.82% from 2016 to 2017. This is in line with prior historical demand growth for SEQ.

Total non-residential water usage (based on the most recent retail billing data available)
Total non-residential demand decreased by 7.51% from 2016/17. This was largely attributable to lower water usage for the industrial and manufacturing sectors. It is not known at this stage if this is an ongoing declining trend or only a short-term temporal situation.

Local Government Area water consumption
Table 2 details consumption at the local government area. This data shows that overall for SEQ the residential usage volume and per capita usage is continuing to increase.

Region / LGA	Annual Production Volume (ML/Year)			Per Capita Consumption (Litre/person/day)[1]		
	2016/17	2017/18	% Change	2016/17	2017/18	% Change
SEQ	307,875	308,215	↑ 0.11%	177	179	↑ 1.35%
Brisbane	118,198	118,160	↓ 0.03%	174	172	↓ 1.30%
Gold Coast	62,065	62,368	↑ 0.49%	194	213	↑ 9.81%
Ipswich	20,470	20,912	↑ 2.16%	165	167	↑ 1.17%
Lockyer Valley	2,463	2,358	↓ 4.27%	104	113	↑ 8.00%
Logan	21,086	22,393	↑ 6.20%	153	161	↑ 5.54%
Moreton Bay	32,086	32,315	↑ 0.71%	162	161	↓ 0.59%
Noosa	6,373	6,107	↓ 4.16%	291	275	↓ 5.50%
Redland	13,542	13,148	↓ 2.91%	197	190	↓ 3.73%
Scenic Rim	2,794	1,762	↓ 36.96%	114	117	↑ 2.34%
Somerset	1,911	2,006	↑ 4.96%	194	200	↑ 3.02%
Sunshine Coast	26,887	26,685	↓ 0.75%	195	190	↓ 2.51%

1. Actual annual residential LPD as used in the Water Security Program demand modelling.

Table 2: 2017 and 2016 bulk production volume and per capita residential consumption comparison on a local government area (LGA) basis

The 2017 residential and non-residential sectors consumption market share, shown in Figure 4, remained steady with minor growth in public sector and decline in both large and light industrial sectors with a combined annual consumption of more than one-third of the total non-residential sectors.

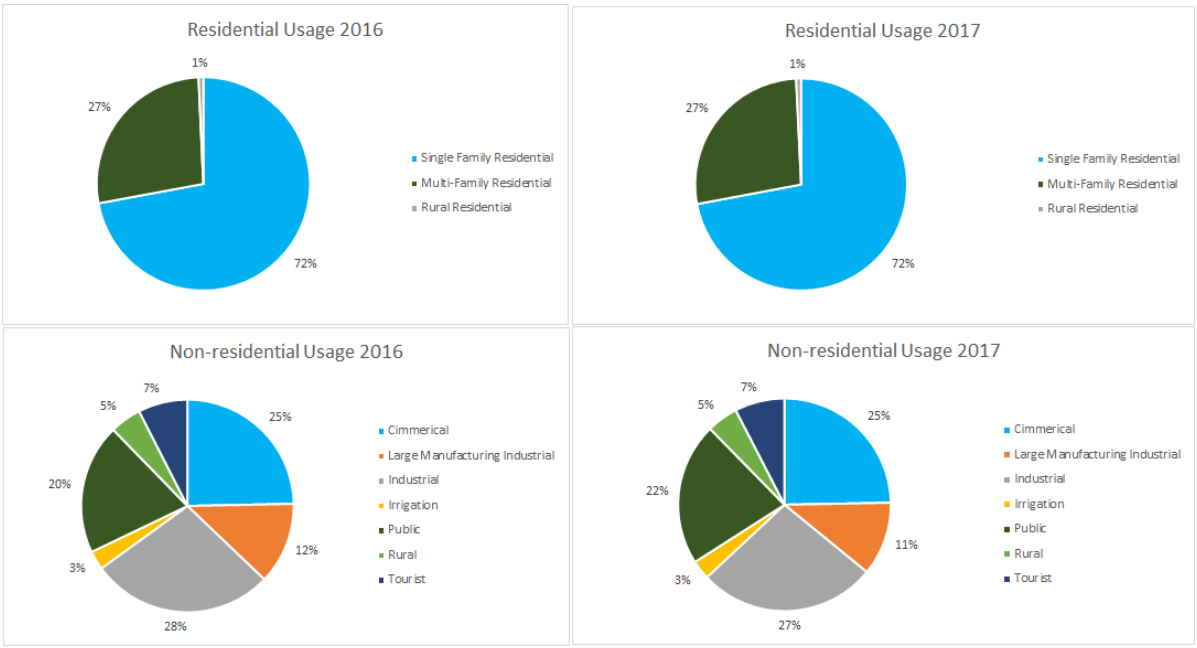

Figure 4: 2017 and 2016 residential and non-residential sectors breakdown pie-chart

Figure 5 shows the Millennium Drought actions: including structural changes, severe water restrictions, Water Efficiency Measurement Plans (WEMP) for large non-residential water using customers (target a demand reduction of 25% or to meet best practice), have resulted in relatively constant demand. In conjunction with the impact of increasing water charges, non-residential per capita demand is not expected to increase unless there is a sharp rise in non-residential output.

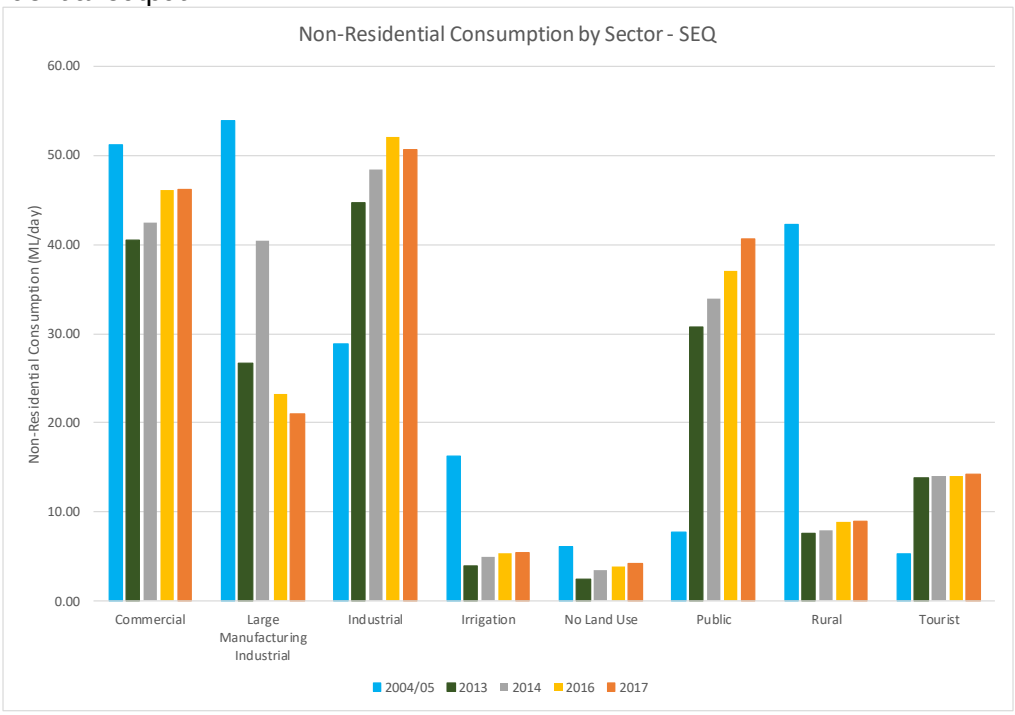

Figure 5: Non-residential sectors consumption tracking.

Annual demand forecast assessment - 2018

Demand projections are assessed annually 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 as detailed in the Water Security Program and considers the previous financial year's consumption. Therefore the 2017/18 consumption data has been used for this 2018 annual demand forecast review.

The 2018 annual demand forecast assessment included the review of key parameters including population projections, residential and non-residential water consumption, total system losses and seasonal variation. Based on this assessment, the 2018 annual demand forecast assessment did not trigger the need for a detailed review of demand forecasts used for water security. The 2017/18 actual annual demand tracked at 1.23% below the Water Security Program planning (medium) demand. This is below the 10% demand review trigger threshold.

The 2018 annual demand forecast assessment concluded:

Actual 2017/18 annual demand

- Actual 2017/18 annual demand is 1.23% below the Water Security Program medium demand (reference Figure 6). The close correlation to previous forecasts resulted in a high-level review focusing on the three core demand drivers of population, residential and non-residential consumption split, and per capita consumption rate.
    - The actual 2017/18 annual demand is 0.11% above the previous financial year consumption level. This is significantly lower than the average long-term historical growth of 3% per annum since 2010/11. The lower than expected annual demand growth in 2017/18 is also despite of the short-term hot and dry extreme weather conditions experienced in September 2017 and January 2018.

Low demand - 2018 annual demand assessment

- The 2018 annual demand review low demand (solid green line in Figure 6), aligns close to the Water Security Program low demand, until around 2023/24. By the end of the long term forecast period 2055/56 there is an upward divergence of approximately 14% (Figure 7). This higher future volume is mostly attributed to higher future low series population estimate in the Queensland Government Statistician Office (QGSO) 2015 edition population projections.

Medium demand - 2018 annual demand assessment

- The 2018 annual demand review medium demand (solid blue line in Figure 6), is 3.6% lower at the start of the five-year annual budget forecast (2019/20), and 3.8% lower at the end of the five-year annual budget forecast (2023/24) when compared to the Water Security Program medium (planning) demand (purple dashed line in Figure 6). By 2055/56 there is a forecast upward divergence of approximately 6%.

  Medium demand uses the same future medium series population estimate as the high demand.

High demand - 2018 annual demand assessment

- The 2018 annual demand review high demand (solid red line in Figure 6), is 6.4% lower at the start of the five-year annual budget forecast (2019/20), and 3.8% lower at the end of the five-year annual budget forecast (2023/24) when compared to the Water Security Program high demand (red dashed line in Figure 6). By 2055/56 the downward divergence is 3%.

The lower future volume is mostly attributed to the revised lower future medium series population estimate in the Queensland Government Statistician Office (QGSO) 2015 edition population projections. The high demand forecast profile uses a high per capita residential demand factor coupled with medium serious population forecast.

Long-term demand deviation

- Long-term demand deviation between the Water Security Program and the 2018 annual demand assessment of low, medium and high demands are shown in Figure 6.

  Long-term deviation for medium and high demand is solely attributed to the revised population adjustment in the QGSO 2015 edition population estimate from the earlier QGSO 2011 edition population estimate since future demand estimate remains the same in the Water Security Program and 2018 annual assessment.

  Long-term deviation between Water Security Program and the 2018 annual assessment low demand is influenced by the lower than expected actual consumption observation on top of the QGSO population adjustment.

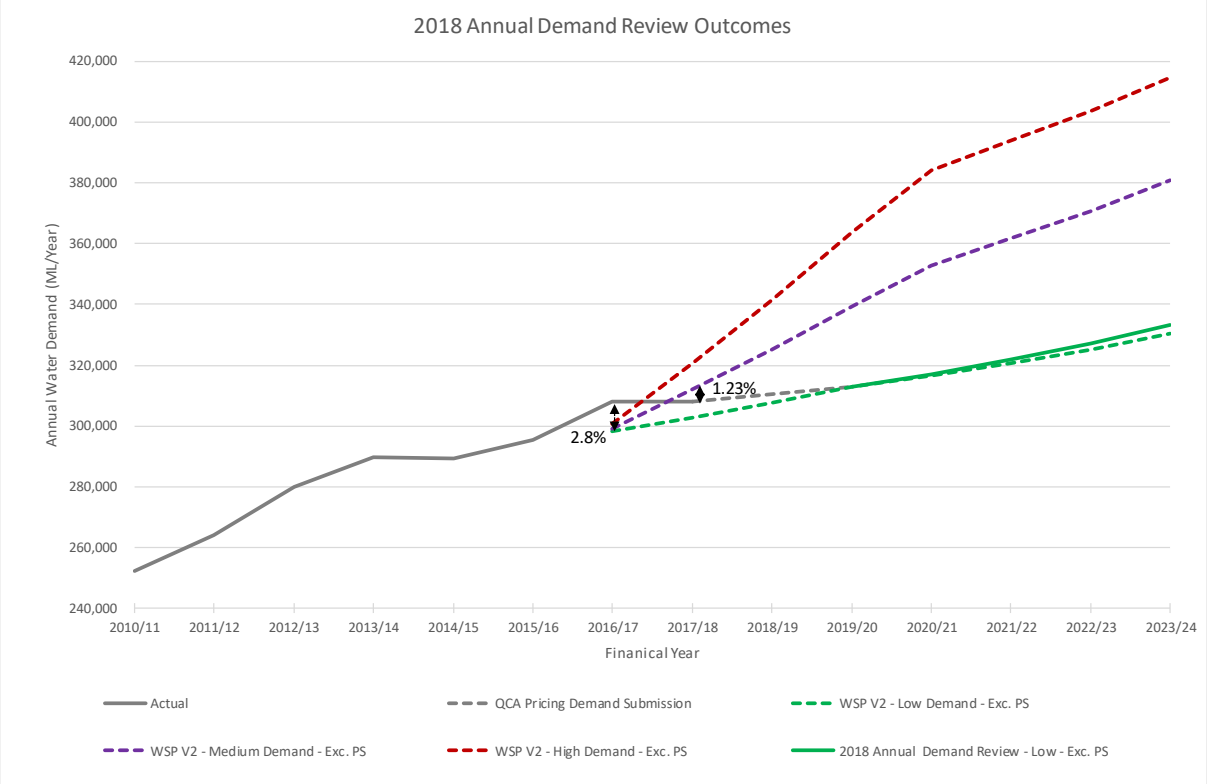

Figure 6: Overview of 2018 annual demand forecast review

Although 2017/18 financial year experienced some extreme climatic event days, 2016/17 and 2017/18 were both considered as normal climatic years based on the Department of Environment and Science assessment. The lower than expected 2017/18 annual water demand growth highlights the need to appropriately identify short-term demand uncertainty brought on by temporary weather abnormalities. These tend to have limited overall annual impact for total annual demand.

Seqwater will need additional actual consumption data before making longer-term downward adjustments to future per capita consumption growth expectations. For this reason, the future per capita consumption expectation remains at 185 L/p/d in alignment with the Water Security Program. Non-residential projected demand also remains at 100 L/p/d in alignment with the Water Security Program. Seqwater continues to monitor actual water consumption on a weekly basis and in more detail as part of each annual demand assessment.

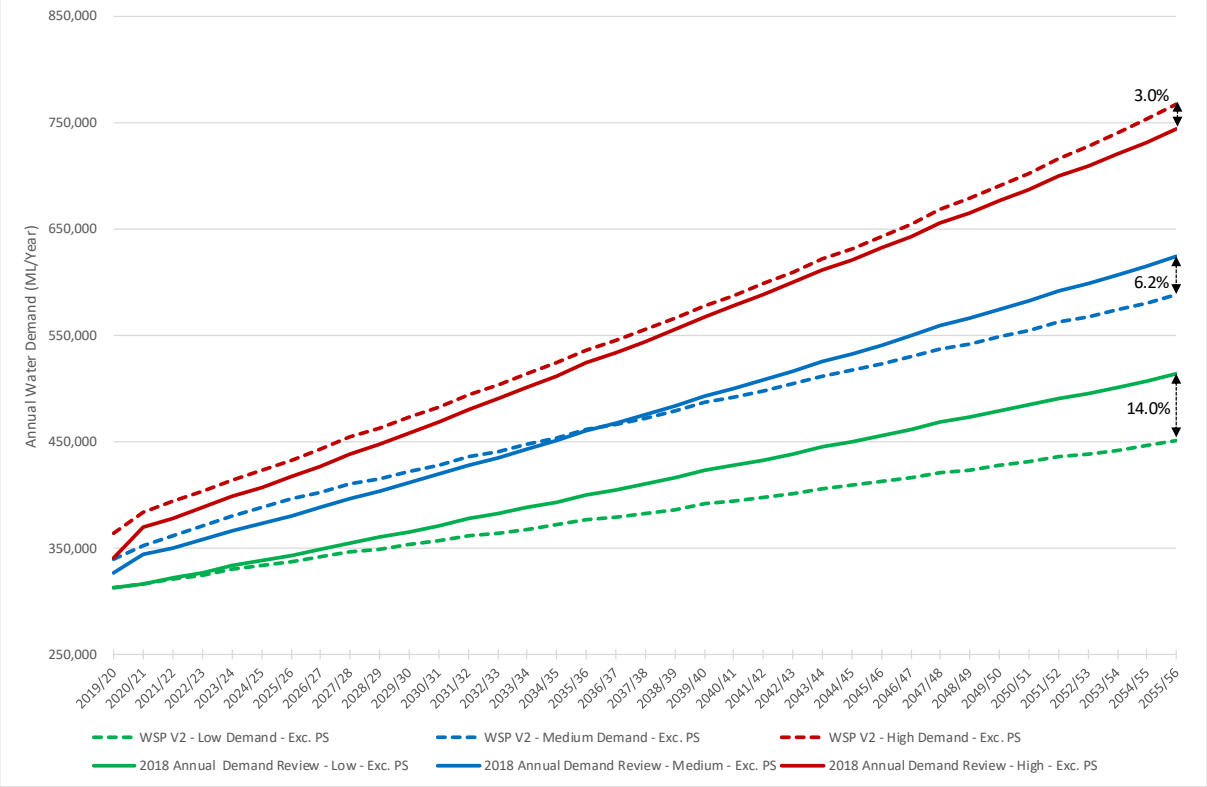

Figure 7: Water Security Program demands compared to 2018 annual assessment demands (excluding Power Station consumption)

Table 3 details the 2018 annual demand forecast assessment low and medium demand for SEQ from 2019/20-2023/24, excluding power station consumption.

Table 3: 2018 Annual Demand Review

Financial Year	Low demand SEQ (ML/Year)	Medium demand SEQ (ML/Year)
2019/20	312,968	327,147
2020/21	316,852	343,917
2021/22	321,833	350,691
2022/23	327,225	358,104
2023/24	333,375	366,356

Seqwater continues to work with the SEQ Service Providers to understand longer-term demands and potential demand management options.

Off-grid community demand projection assessment

An assessment of the demands for each of the off-grid communities has been completed based on the latest production figures. All off-grid communities are tracking within the Water Security Program demand projections except for Dayboro which will be carefully monitored and assessed to understand the reasons for the increase and any implications on future water supply planning for the area.

5.0 Drawdown scenarios

On a regional basis, storages dropped to almost 75% for the key bulk water storages (KBWS) in February, October and December 2018. The KBWS are the 12 major water supply dams in SEQ connected to the water grid. Figure 8 details the actual drawdown of the KBWS throughout 2018. Figure 9 indicates how the KBWS levels have drawn down since June 2018 in comparison to the Millennium Drought and Design Drought inflows with the current drought response approach (including the water grid, GCDP and WCRWS). The impact on the sub-regional storages is shown in Appendix C. All sub-regional storages filled in March 2018.

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 version 2 based on data from our stochastic record to define a potential drought worse than the Millennium Drought. All droughts start with declining inflows; it is the severity and duration of the drought that differs.

Sub-regionally the drawdowns were varied with 2018 demonstrating the significant impact the level for Lake Wivenhoe has on the key bulk water storage capacity. Post March 2018 many of the key bulk water storages were close to their full supply level (noting some were temporary full supply levels). Wivenhoe did not exceed 78% capacity and fell in November to 68%. Given the other main storages are at full capacity and the key bulk water storage level is at 77% (November 2018), without good inflows into the Somerset-Wivenhoe system that the central sub-regional storage level could drive a region wide drought response.

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

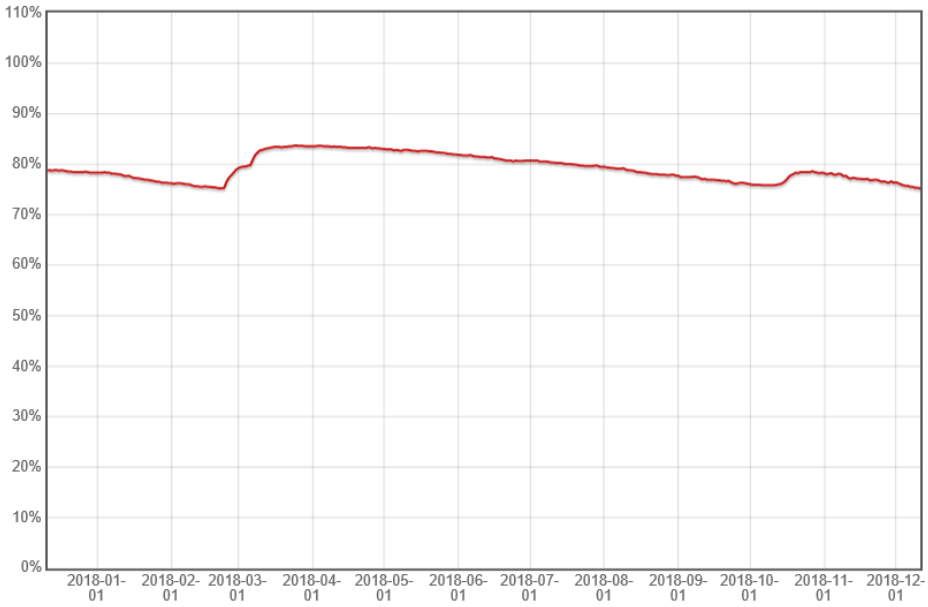

Figure 8: 2018 KBWS levels maintain a sideways and slightly declining drawdown

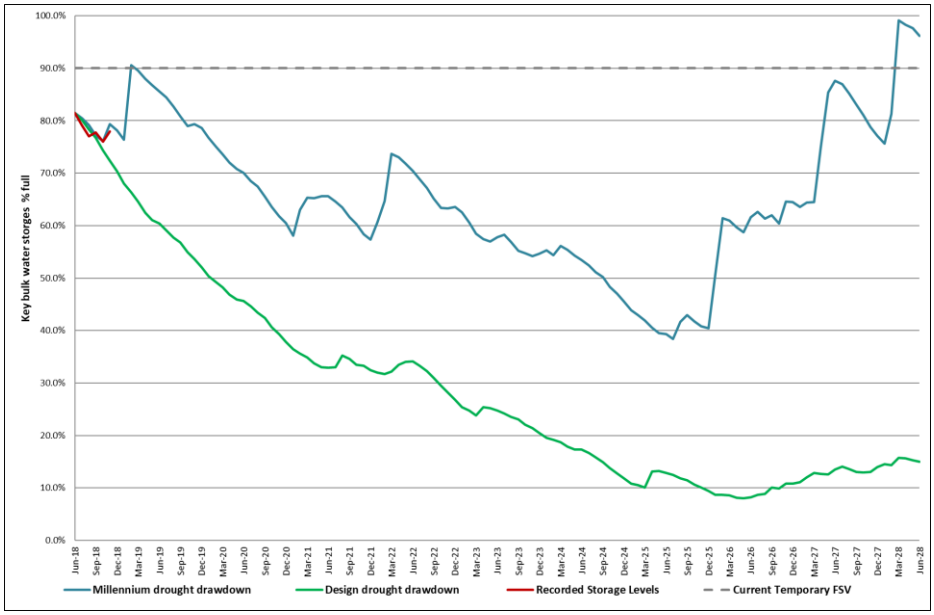

Figure 9: Key bulk water storage drawdowns

Since mid-2017, the key bulk water storages (KBWS) of SEQ water storages are showing a declining sideways trend (Figure 8). The KBWS were generally maintained around 75-85% capacity. The October 2017 and March 2018 rainfall events resulted in a welcomed increase in all major water storages, particularly in the northern sub-region. Historical drawdowns for each storage and the key bulk water storage can be found at https://www.seqwater.com.au/water-supply/dam-levels.

Figure 9 details the drawdown of the key bulk water storages since June 2018. This timing reflects when the key bulk water storages received major rainfall, and the commencement date for the stochastic model runs. Appendix C indicates the drawdown of the key individual water supply sources across the region from June 2018. 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 sub-regions

- 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 (i.e. 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.

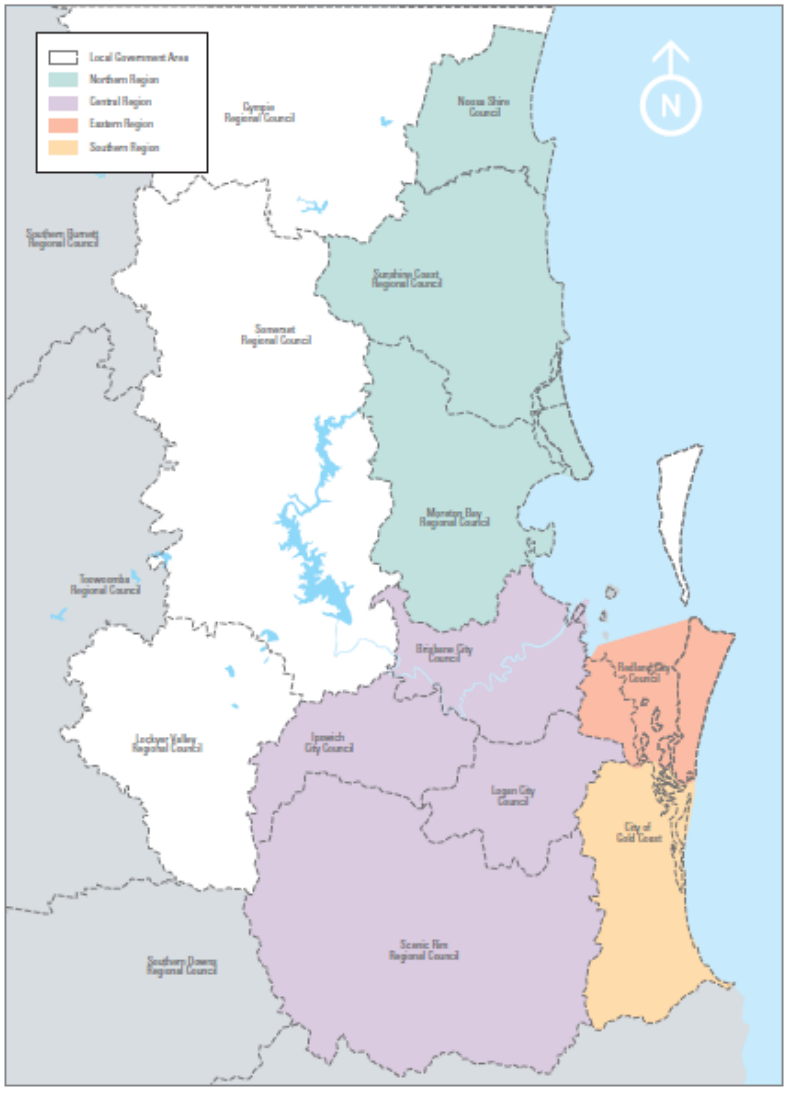

Figure A-1: Sub-regions of the South East Queensland Water Grid

Appendix B – 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 from 80 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 C – Sub-regional storage drawdowns

Each of the graphs below (Figures D-1 to D-11) show for each key storage:

- The recorded (actual observed) drawdown for 2018
- How the system would have responded to Millennium Drought inflows with the current drought response approach (including the Water Grid, GCDP and WCRWS) for that storage/s, based on the drawdown since June 2018
- 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, based on the drawdown since June 2018.

Wivenhoe and Somerset Dams

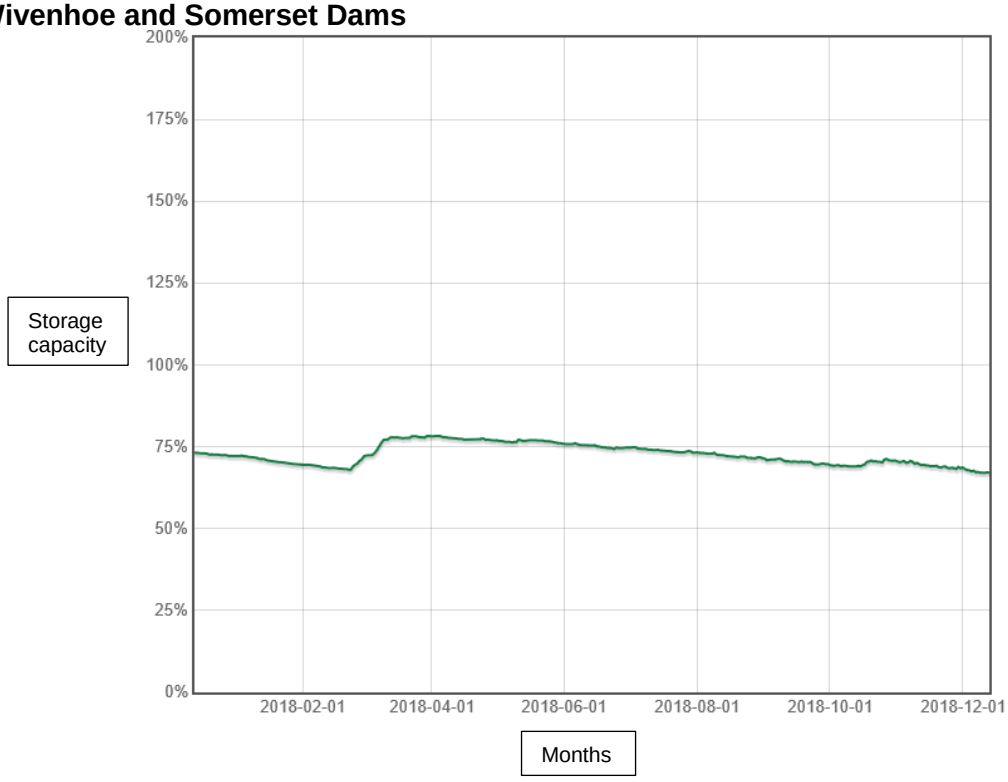

Figure D-1: Actual 2018 drawdown of Wivenhoe Dam

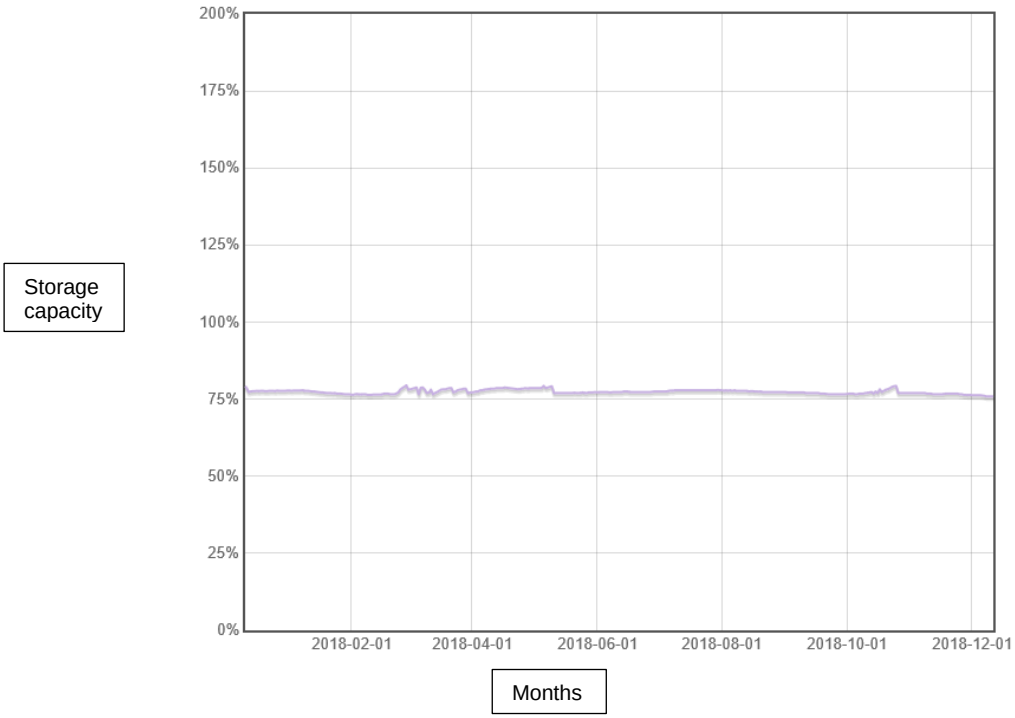

Figure D-2: Actual 2018 drawdown of Somerset Dam

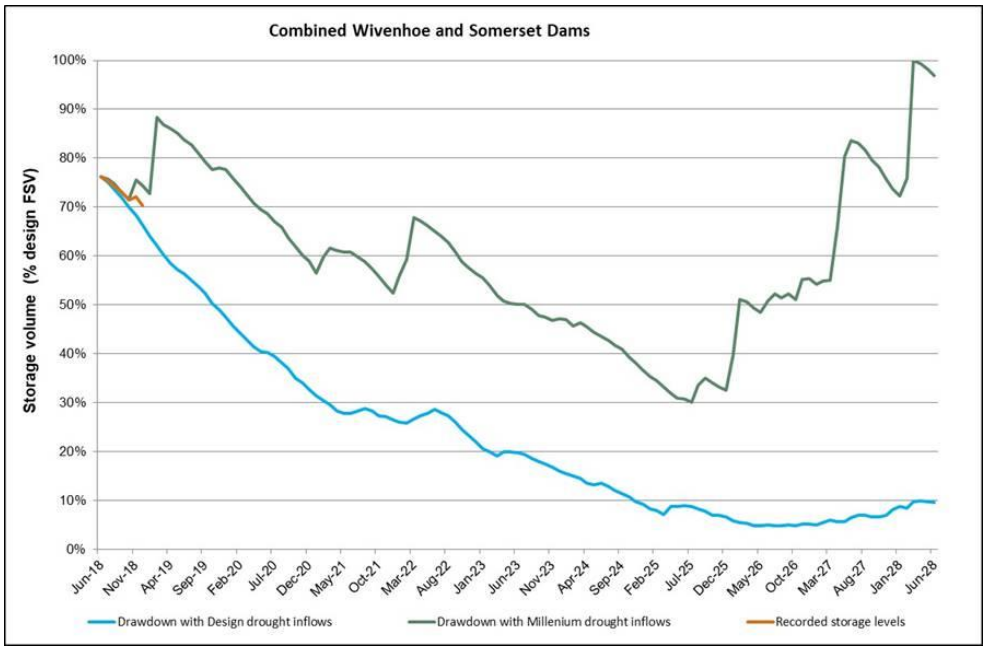

Figure D-3: Drawdown of combined Wivenhoe and Somerset storages

Figures D-1 and D-2 show Wivenhoe and Somerset Dams had a sideways trend to their drawdown throughout 2018. Wivenhoe did not exceed 78% capacity and fell in December to 67%.

Figure D-3 shows the combined storage of Wivenhoe and Somerset dams, representing 70.3% of the KBWS capacity at full supply. Whilst all other storages are close to full these storages remain low. Even whilst the other storages are full, the impact of these combined storages on the KBWS level is significant potentially pushing the region into a drought response whilst the other storages are full.

Hinze Dam

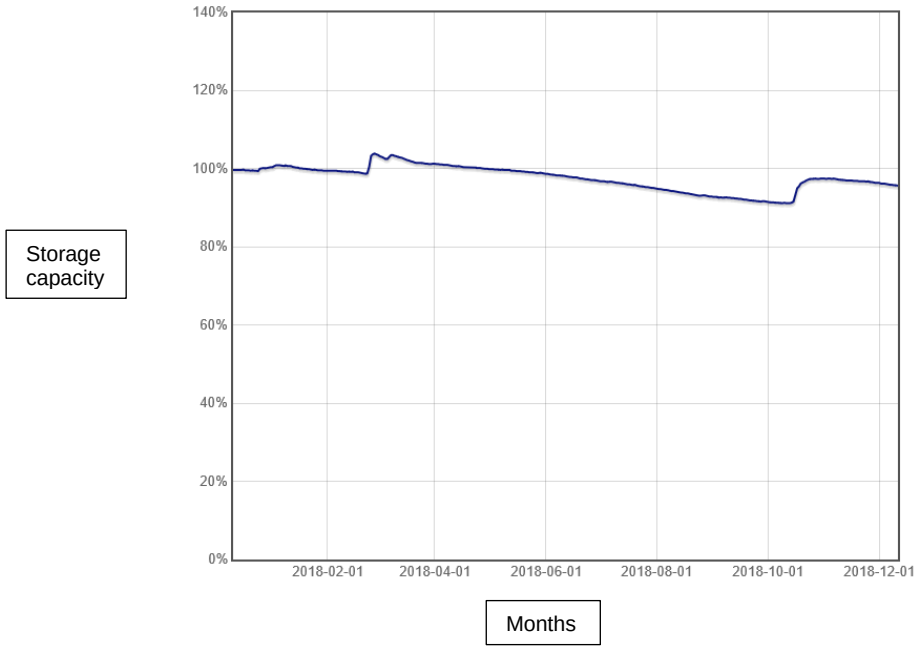

Figure D-4: Actual 2018 drawdown of Hinze dam

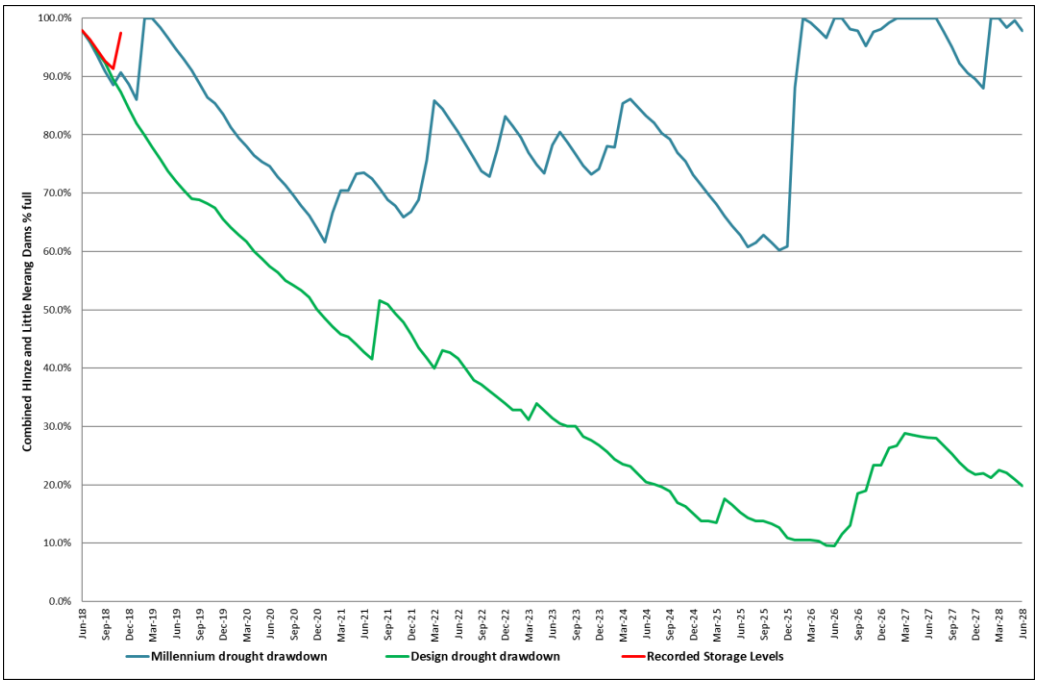

Figure D-5: Hinze dam drawdown

Figure D-4 indicates that Hinze Dam remained above 91% for 2018.

Figure D-5 shows that Hinze Dam has received consistently good inflows resulting in the recorded drawdown being substantially above the Millennium and Design drought drawdowns.

Baroon Pocket Dam

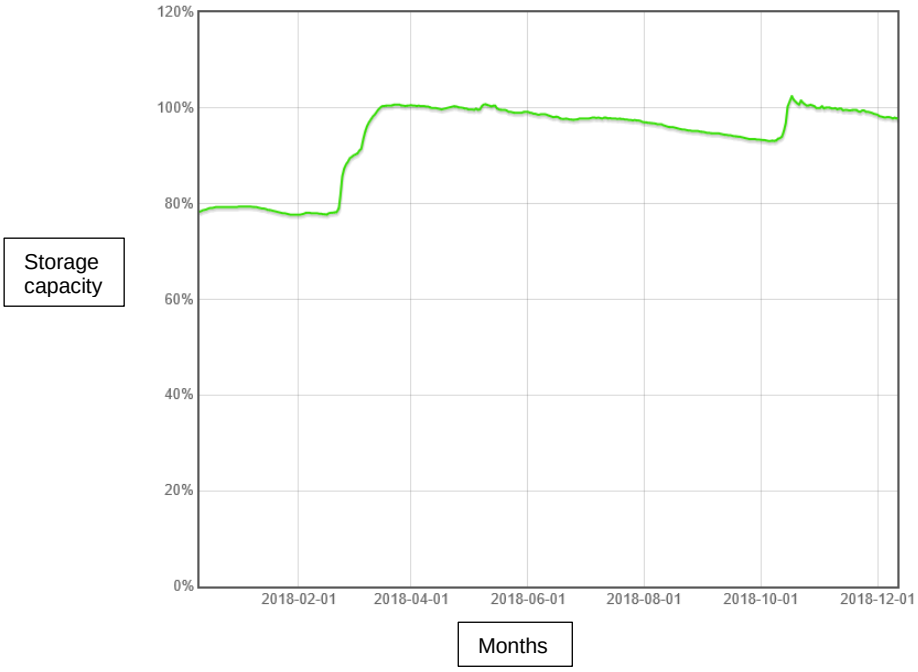

Figure D-6: Actual 2018 drawdown of Baroon Pocket dam

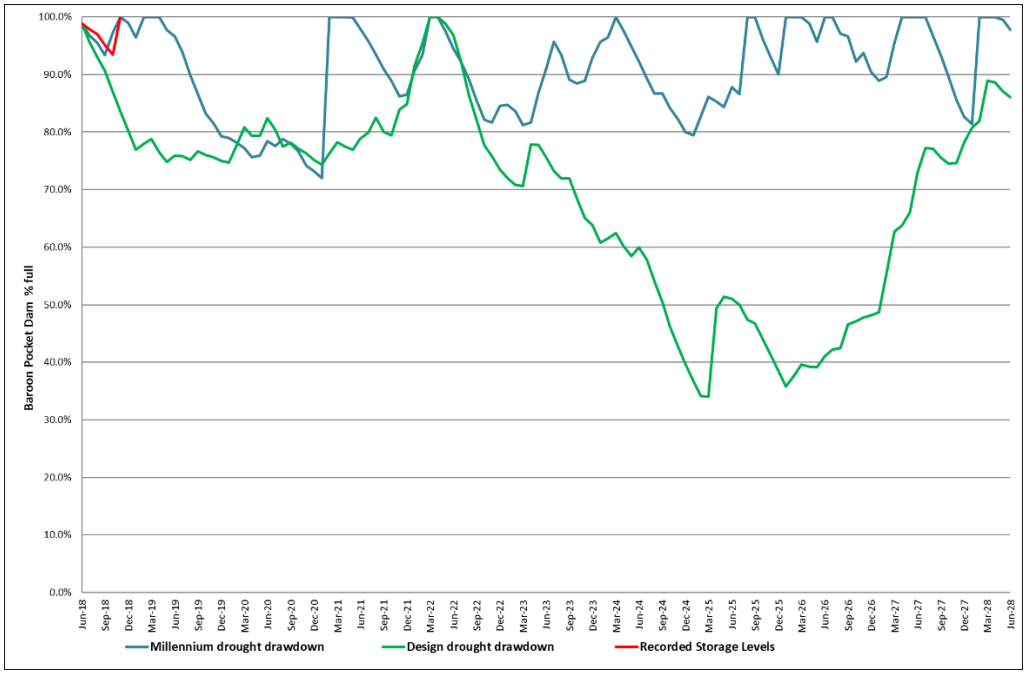

Figure D-7: Baroon Pocket drawdown (June 2018)

Figure D-6 indicates the good rainfall event received in early 2018 and the maintenance of this storage above 93% post that rainfall event.
Figure D-7 shows that with changed grid operations to support Baroon Pocket Dam and the significant inflows received, the storage is tracking well above the Design Drought simulation.

Table D-1 details the revised operational triggers for the Northern sub-region.

Baroon Pocket Dam storage level	Trigger O - Operational PO – Pre-operational C - Capital	Action	Estimated Landers Shute WTP Production [ML/day]
100%	PO	• Investigate supply, system operation and/or demand solutions.	60-100 (Base/Reduce)
90%	O	• Reduce export to the NPI to achieve minimum operational requirements in the NPI • Minimise import from the NPI to Maroochy/Image Flat WTP via the Nambour offtake • Noosa WTP increases production to supply local Noosa demand and export 5-15 ML/d into the NPI2 in SFD • Operate Ewen Maddock to minimise Landers Shute production	60-100 (Base/Reduce)
80%	O	• Stop all exports to the NPI and operate NPI1 in a northerly direction Eudlo pump station import of 5-15 ML/day to Landers Shute supply area from NPI1 and NPI2	10-50 (Base/Minimise)
40%	PO	• Water Supply Planning to review Banksia Beach WTP operational need.	10-50
35%	PO	• Operations to initiate hot standby operation planning for Banksia Beach WTP (i.e. 6 months' notice period begins). Subject to revision at 40%	10-50
25%	O	• Maximise Banksia Beach WTPs and reduce import from NPI by approximately 5 ML/day. Subject to revision	10-50
7% MOL	O	• Contingent drought infrastructure operation if required	0

Table D-1: Pre-operational and operational triggers for the Northern Sub-region, as amended post the 2017 drought event

North Pine Dam

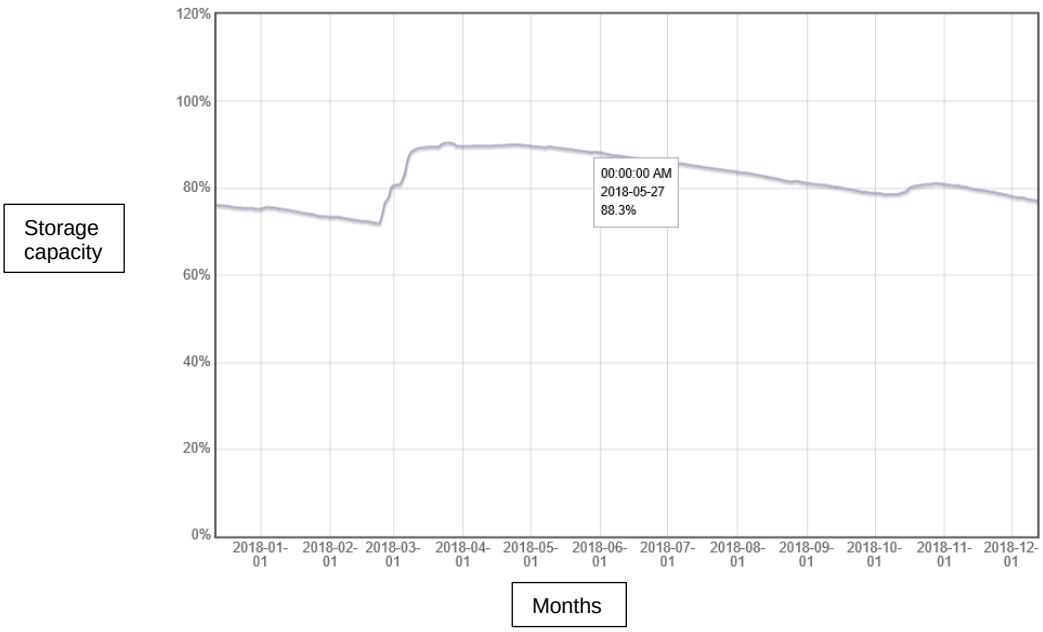

Figure D-8: Actual 2018 drawdown of North Pine dam

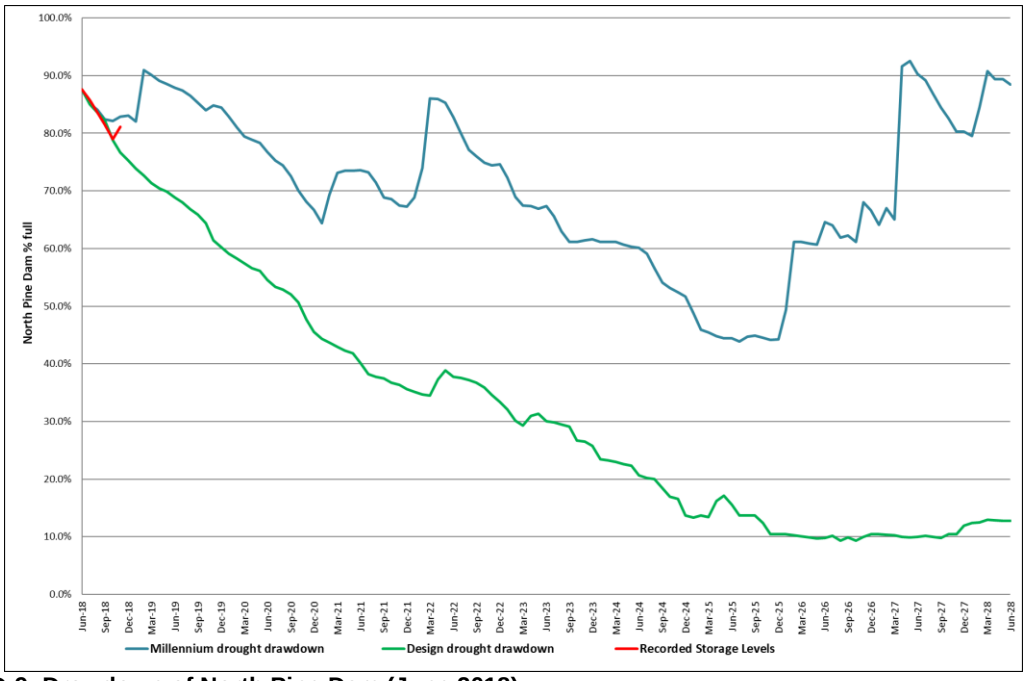

Figure D-9: Drawdown of North Pine Dam (June 2018)

Figure D-8 indicates that the North Pine Dam level fell to 71.9% in February 2018, but then rose post a rain event and was maintained above 78% post that event.

Figure D-9 shows that North Pine Dam post the rainfall event is now tracking above the Design Drought simulation. North Pine Dam 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.

Leslie Harrison Dam

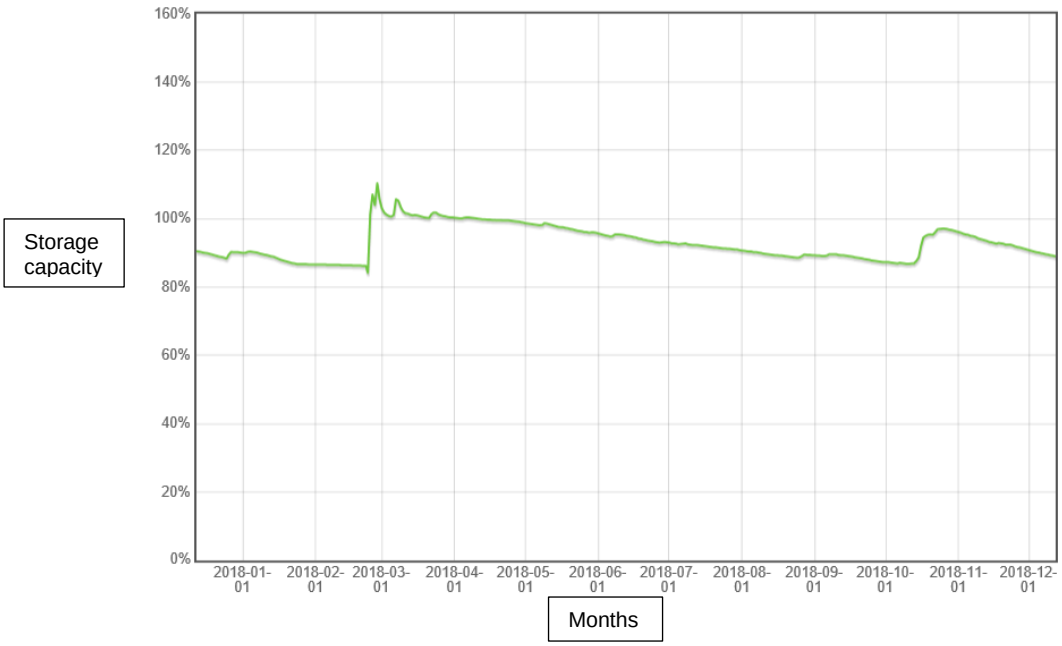

Figure D-10: Actual 2018 drawdown of Leslie Harrison Dam

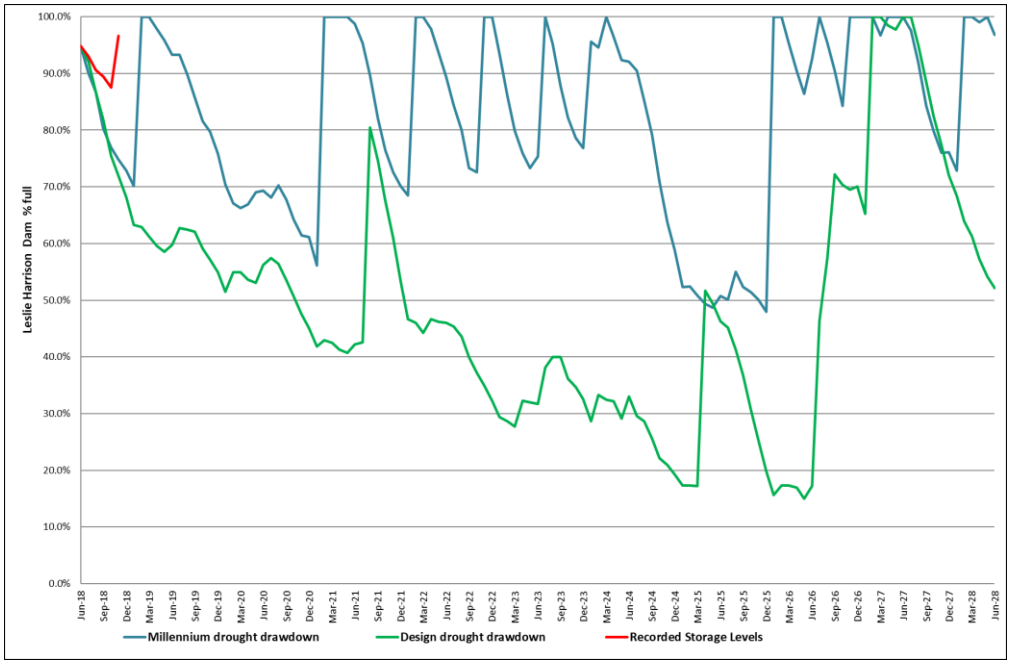

Figure D-11: Eastern sub-region drawdown

Figure D-10 indicates that Leslie Harrison Dam remained over 86% capacity for the 2018 period represented in the graph.

Figure D-11 shows that the Leslie Harrison Dam drawdown is above the Millennium Drought simulation.