Fact Sheet: Bundaberg Water Supply Scheme

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Understanding the Bundaberg Water Supply Scheme

The Bundaberg Scheme supplies water to farmlands and communities in Burnett, Kolan and Isis Shire as well as Bundaberg city. The scheme sources water from Fred Haigh and Paradise Dam.

How the Scheme Works

- More than 600km of channel and pipeline distribute supplies to more than 1,000 properties.
- The scheme consists of seven distinct channel systems that supplement or replace demand for groundwater in the district.

Water Uses

- Irrigation water for crops including sugar cane, tomatoes, rock melons, watermelons, capsicum, zucchini, beans, macadamia nuts and avocados.
- Urban water supply for townships within the Bundaberg region including Childers and Gin Gin.
- Industrial water for various enterprise including sugar mills

Scheme History

- In 1970 the Queensland Government adopted a proposal for a two-phase water supply scheme for the Bundaberg district. Construction began that year, with the second phase completed in 1993.
- Ned Churchward Weir was added to the scheme in 1998.
- Bundaberg is one of the driest sugar-producing areas in Queensland and up until the early 1970s a small sub-artesian water resource was used to irrigate crops.

Intent and Constraints

- Designed with primarily cane production in mind – this formed the basis of the size and design of assets within the scheme to deliver 4.5 ML per hectare to supplement rainfall.
- Original allocations and assigned flow rates were based upon land area under cane consignment in 1970.
- The channel and pipeline network were sized to enable water to be delivered in the traditional 90 – 120 day active growing season for cane, this is via a rostered flow applied to each metered outlet within a 15 day roster cycle and all based on land area under production at the time.
- Sunwater still operates the scheme with water users restricted to the original assigned flow rates for individual metered outlets.
- There has been major diversification away from cane cropping in the region to include many other types of crops which include permanent plantings horticulture and monoculture.
- This change hinders the schemes capacity to deliver water effectively to match the demand profiles of the different cropping.
- A large portion of the distribution scheme has reached design capacity across a number of pump stations, channel and pipeline systems.

Storage and Capacity

- Fred Haigh Dam - 562,000ML
- Bucca weir - 11,600ML
- Kolan Barrage - 4,020ML
- Paradise Dam - 300,000ML
- Ned Churchward weir - 29,500ML
- Ben Anderson barrage - 30,300ML

Sub-schemes

- Burnett River sub-scheme
- Kolan River sub-scheme

Challenges and Opportunities

- 13 pump stations, rising electricity costs placing pressure on customer profit margins.
- Cropping is diversifying away from cane production due to viability of the industry.
- Scheme is being placed under pressure to deliver water to alternate crops with differing water requirements to that of sugar cane and the original design intent.
- The majority of the scheme distribution assets are at design capacity.
- Diversified cropping results in maintenance shutdowns being more difficult to implement without impacting cropping due to all year cropping.

Sunwater Role and Responsibilities

- Sunwater operates individual schemes within an annual approved budget. This is broken into two main streams being: routine expenditure which is for general operational costs (electricity, insurance, staff costs, preventative, corrective maintenance); the other budget stream is for non-routine costs such as major refurbishment/renewal of assets and is funded through an annuity system.
- Sunwater is mandated by its shareholders that any major capital investment in new infrastructure must be commercial this needs to be demonstrated by a detailed business case.
- We can partner with customers to assist with developing proposals to address capacity constraints and depending on the available funding pathway, delivery costs may be shared with customers.

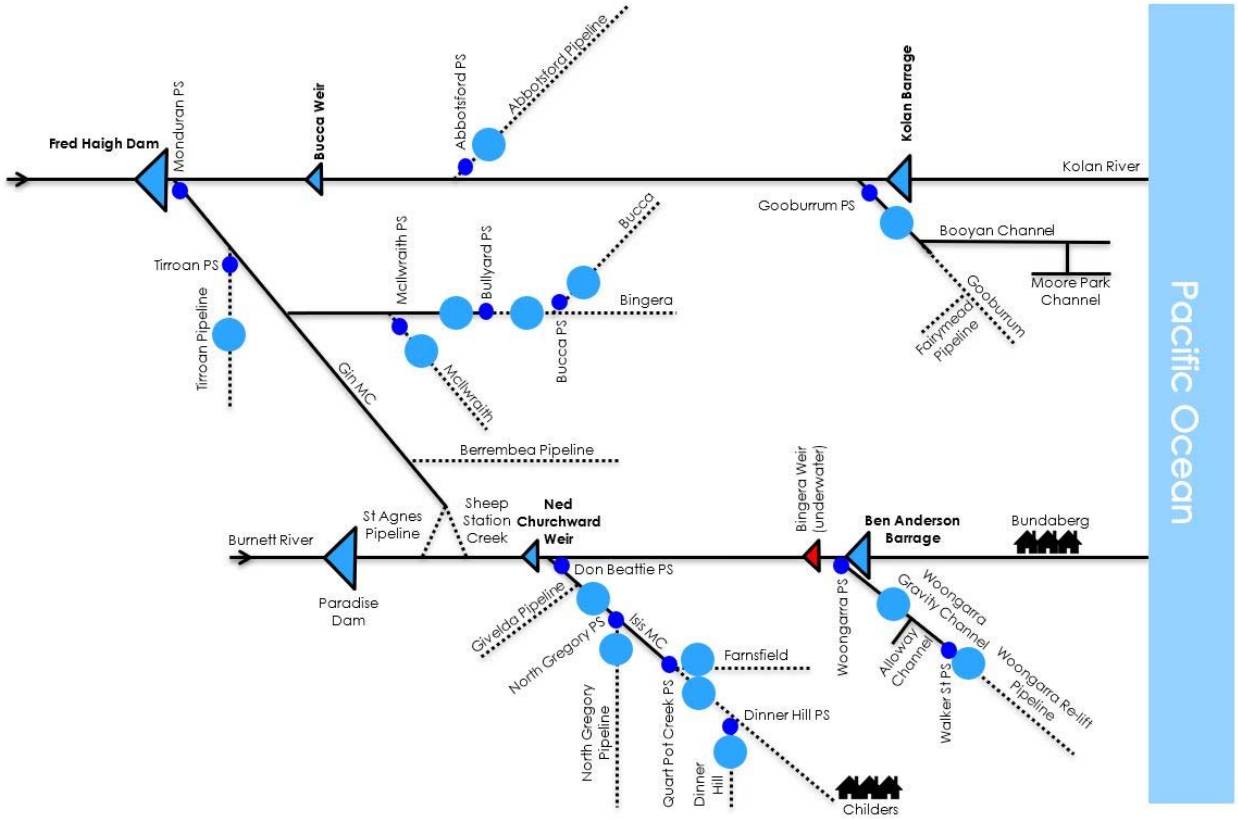
Key Infrastructure

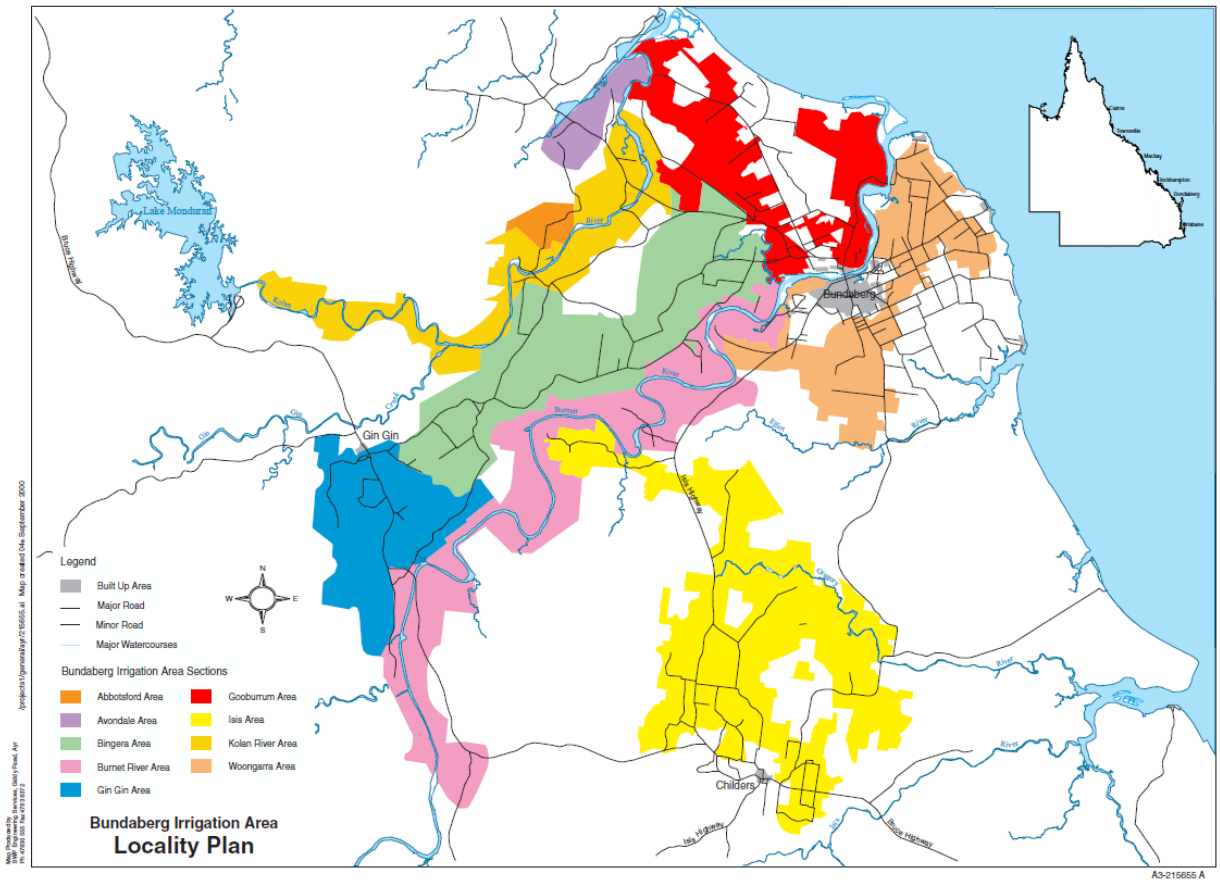
Asset	Description	Capacity
Woongarra Balancing Storage	Earthen embankment constructed across two small watercourses. Classified as a referable dam under the *Water Supply (Safety and Reliability) Act 2008*.	1225 ML
Gooburrum Balancing Storage	Earth embankment across a shallow depression	1040 ML
Bullyard Creek Balancing Storage	Earth embankment	453 ML
Monduran pump station	3 pumps	1100 ML/day
Don Beattie pump station	3 pumps	648 ML/day
Bullyard Creek pump station	4 pumps	415 ML/day
Woongarra pump station	5 pumps	395 ML/day
Gooburrum pump station	2 pumps	300 ML/day
Quart Pot Creek pump station (two sections)	4 pumps (2 in each section)	250 ML/day 275 ML/day
Walker Street pump station	4 pumps	225 ML/day
Dinner Hill pump station	3 pumps	160 ML/day
Tirroan pump station	2 pumps	72 ML/day
North Gregory pump station	2 pumps	63 ML/day
Bucca pump station	2 pumps	60 ML/day
McIlwraith pump station	2 pumps	60 ML/day
Abbotsford pump station	2 submersible pumps	23.7 ML/day

Paradise Dam Capacity Under a Range of Scenarios

Paradise Dam Options	Capacity
Paradise Dam – full supply level	300,000 ML
Paradise Dam – 42% reduced supply level	126,000 ML
Paradise Dam – after the Essential Works to lower the dam by 5.8 metres	170,00 ML

Note a decision on the long-term future of the dam is yet to be made.




Lake Monduran
Bundaberg
Gin Gin
Childers
Legend
Built Up Area
Major Road
Minor Road
Major Watercourses
Bundaberg Irrigation Area Sections
Abbotsford Area
Avondale Area
Bingera Area
Burnet River Area
Gin Gin Area
Gooburrum Area
Isis Area
Kolan River Area
Woongarra Area
Bundaberg Irrigation Area
Locality Plan
A3-215655 A

Paradise Dam

Ben Anderson Barrage

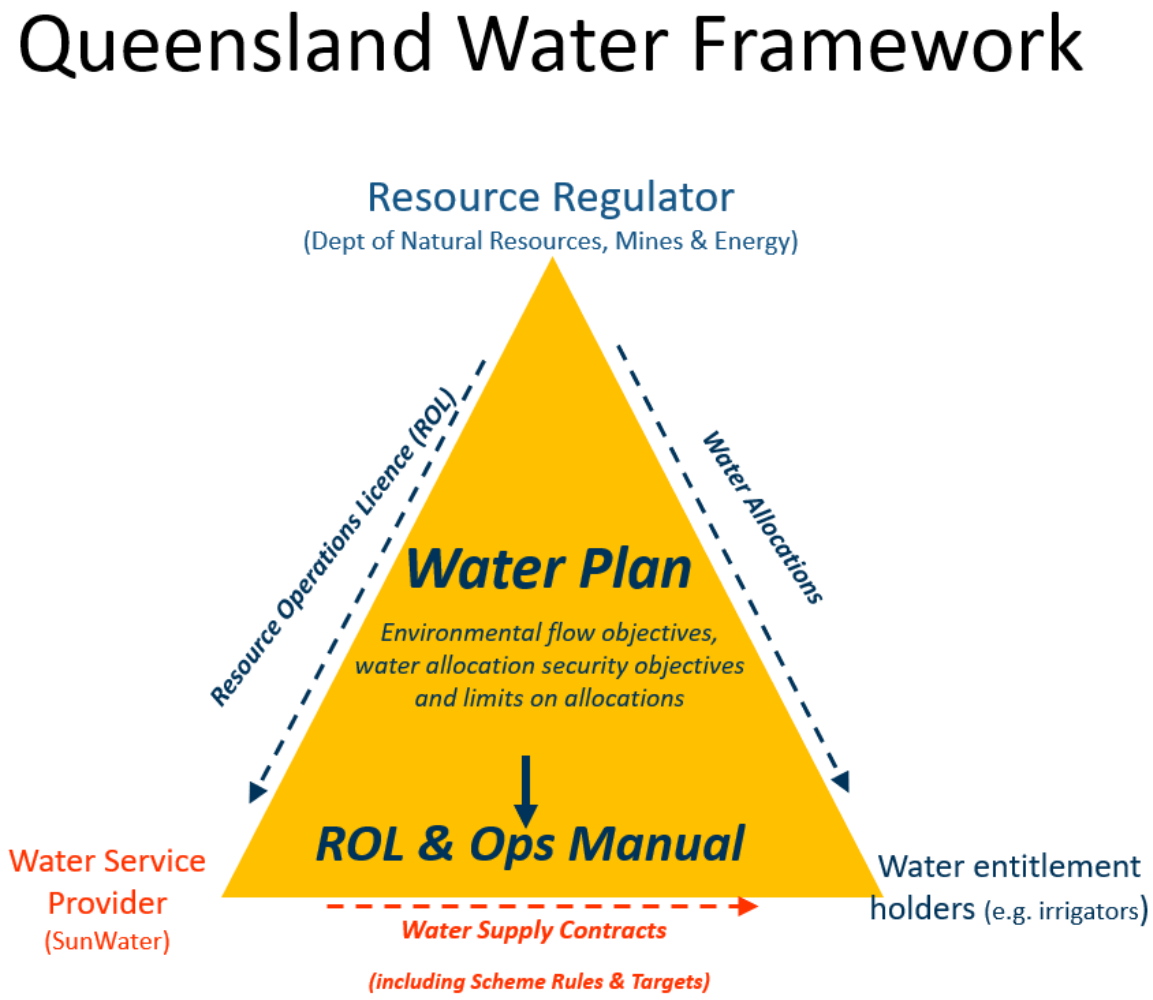
Fred Haig Dam

Ned Churchward Weir

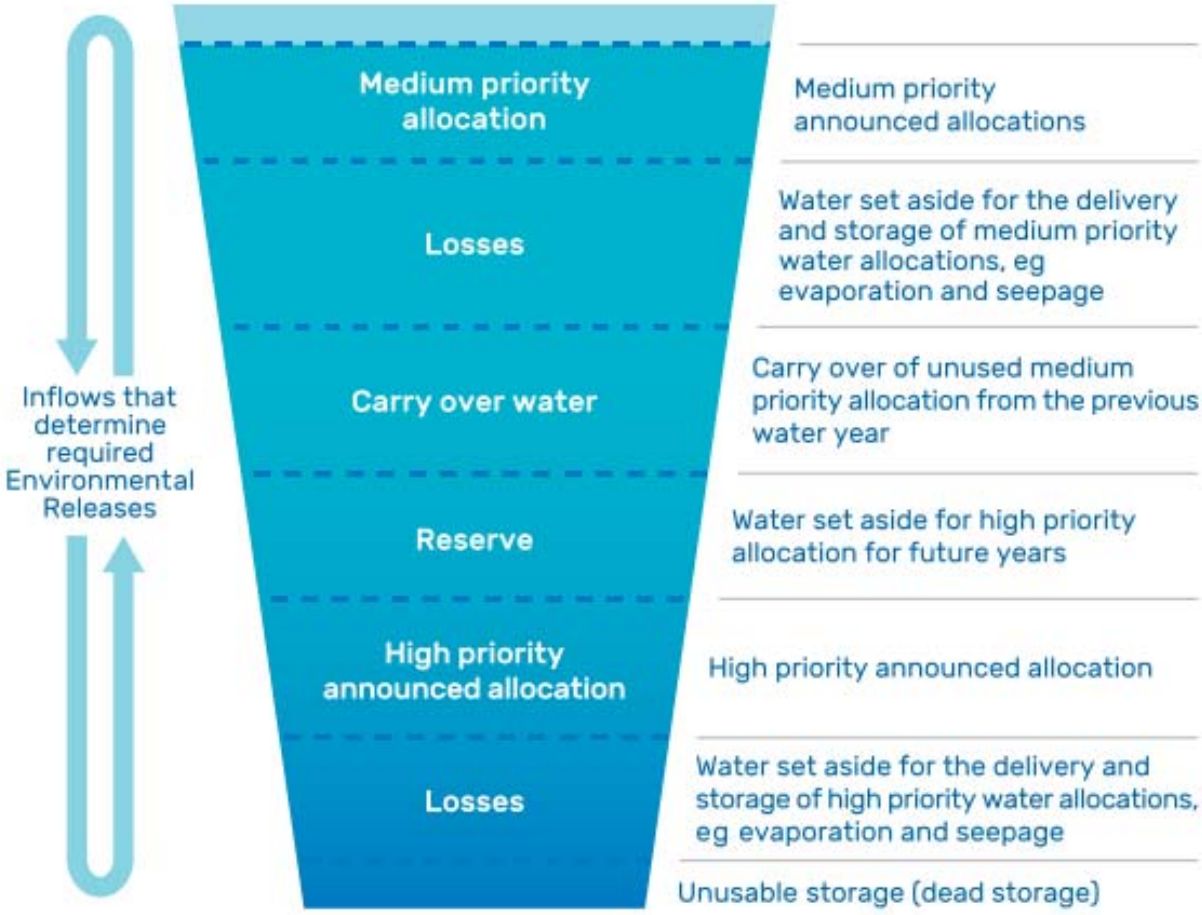
Understanding How Announced Allocations (AA) Work

Regulatory Context

- In February this year the Department of Natural Resources, Mines and Energy changed administration of the scheme from a Resources Operations Plan (ROP) to an Operations Manual under a Resource Operations Licence (ROL) issued by the Department of Natural Resources, Mines and Energy.
- The ROL is issued under the *Water Act 2000* and must be consistent with the Burnett Basin Water Plan.



- The methodology for the announced allocation is stated in Section 9 and 10 of the Bundaberg Water Supply Scheme Operations Manual
- Sunwater must comply with these rules which have been approved by the Department of Natural Resource, Mines and Energy (DNRME).
- The Bundaberg scheme water year is aligned with the financial year.
- AA are calculated based on storage levels on 1 July and announced for the year ahead.
- Announced Allocations cannot be decreased within a water year.
- Sunwater will reassess the available water at each quarter or if major inflows occur and, if possible, increase the announced allocation up to 100%.
- The AA for the Burnett River Sub-scheme counts water stored in Paradise Dam, Ned Churchward Weir, Ben Anderson Barrage and part of (up to15%) Fred Haigh Dam.



How are Announced Allocations calculated?

The useable volume is the current storage volume minus:

- the unusable volume which in this case is the dead storage (water below the lowest offtake); and
- the stated storage loss for that month (evaporation and seepage).

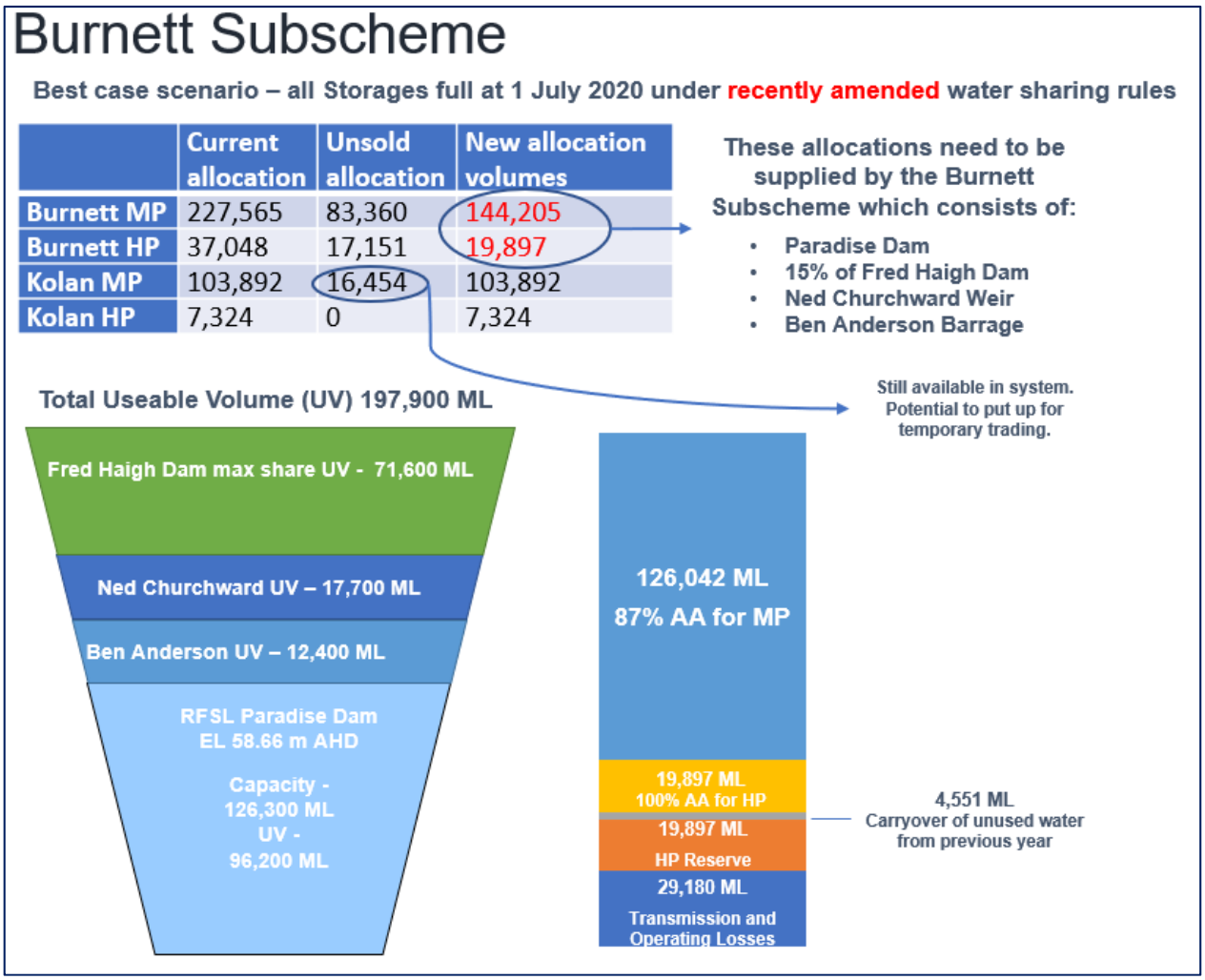
The AA formula takes into account all the water available in the storages. It first removes the dead storage volume and the storages losses as explained above. It then allocates available water (useable volume) firstly to the high priority allocations and then reserves some water for high priority allocations for future years. Any water remaining is then shared to the medium priority customers.

Burnett River Sub-scheme AA's

- The Bundaberg Water Supply Scheme existed prior to the construction of Paradise Dam.
- Paradise Dam created additional allocation in the Bundaberg scheme which now accounts for 38% of the total scheme allocation. Only 20% of the additional allocation created by the dam has been sold.
- Over the last five years, medium priority allocations for the Burnett sub-scheme have ranged between 71 and 91 per cent at the beginning of the water year.
- DNRME has approved an amendment to the Burnett River Sub-scheme water sharing rules which effectively quarantines all unsold Burnett Water Allocations located in the Burnett River Sub-scheme. This will improve announced allocations and should secure announcements within the normal range while works are underway at the dam.
- All customers are now on 100% announced allocation for the rest of this water year.
- Allocations for the 2020/21 water year will be confirmed in July.

- You may have heard a reference to a 16% allocation – this was a rudimentary forecast based on a number of worst-case assumptions. This is no longer accurate.
- History of AA's available at https://www.sunwater.com.au/schemes/bundaberg/
- https://www.sunwater.com.au/customer/announced-allocations/

Announced Allocations under recently amended Water Sharing Rules



Announced Allocations forecasting for 2020 – 2021 water year

Over the last five years, medium priority allocations for the Burnett River sub-scheme have ranged between 71 and 91 per cent at the beginning of the water year. In March 2020 Sunwater received approval from DNRME to amend the water sharing rules for the Burnett River Sub-scheme. This approval along with inflows received in 2020, will secure allocations close to this range for the beginning of the next water year (1 July 2020).

All customers are now on 100 per cent announced allocation for the rest of this water year. Allocations for the 2020/21 water year will be confirmed in July.

Predicted announced allocation forecast

Scenarios	Median inflow forecasts
If Paradise Dam operated as normal under normal rules and not lowered for comparison with options	Burnett MP AA– 54%
Base case - 42% Paradise Dam - Sunwater retains all its allocation - No change to water sharing rules	Burnett MP AA– 27%*
Approved rule change - 42% Paradise Dam - Sunwater forgoes all unsold allocation in Burnett River - Water sharing rules have reduced Reserve and TOL volumes to reflect sold allocation only	Burnett MP AA– 68%*

* To calculate these predictions Sunwater has made an assumption on the volume of water in storage on 1 July, however many variables affect this assumption which may include scheme carryover, inflows, releases and evaporation that may occur between now and 30 June. As such, these are PREDICTIONS ONLY and are intended to provide you an indication of what the announced allocation may be for the 2020/21 water year.

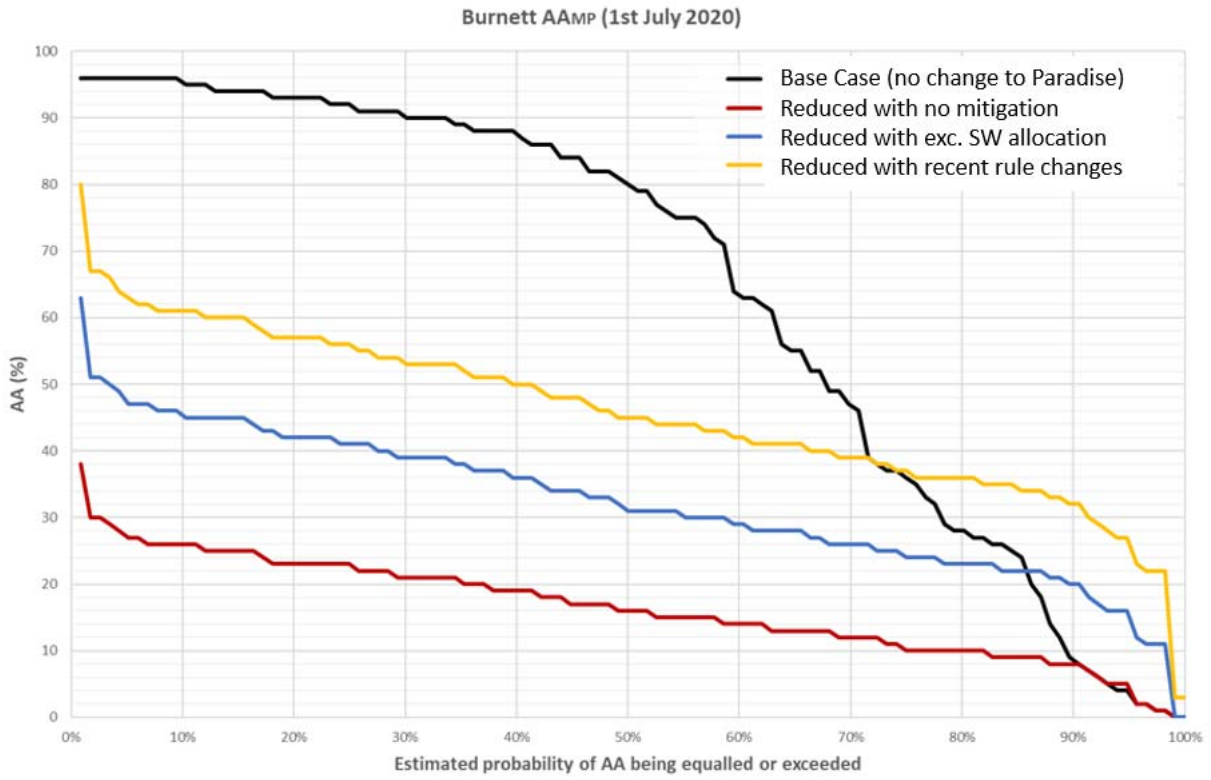
Reliability

What does the following graph tell us about reliability?

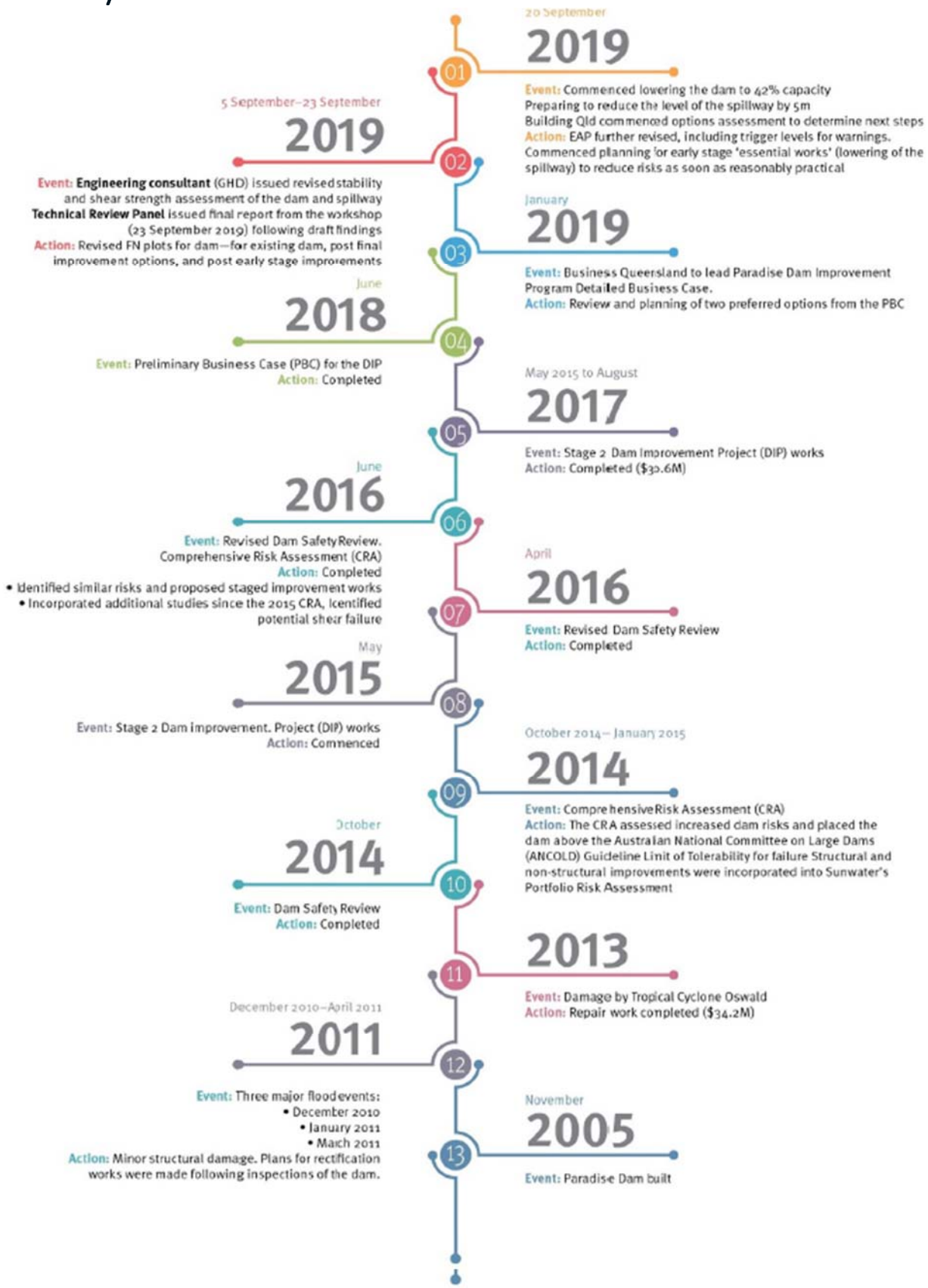
The following chart shows the probability of achieving an announced allocation at the start of the water year (1 July) under a number of potential AA mitigation options.

The vertical axis represents the announced allocation percentage while the horizontal axis represents the probability of achieving that result. On the horizontal axis, 0% represents very wet climatic conditions; 50% represents average climatic conditions and 100% represents very dry climatic conditions.

In March 2020 Sunwater received approval from DNRME to make an amendment to the water sharing rules for the Burnett River Sub-scheme. The approved rules are represented in yellow below. In this scenario you can observe a significant improvement in the announced allocation outcomes under dry to average climatic conditions (i.e. right hand side of chart).



History


20 September
2019
01
Event: Commenced lowering the dam to 42% capacity
Preparing to reduce the level of the spillway by 5m
Building Qld commenced options assessment to determine next steps
Action: EAP further revised, including trigger levels for warnings.
Commenced planning for early stage 'essential works' (lowering of the spillway) to reduce risks as soon as reasonably practical
5 September–23 September
2019
02
Event: Engineering consultant (GHD) issued revised stability and shear strength assessment of the dam and spillway
Technical Review Panel issued final report from the workshop (23 September 2019) following draft findings
Action: Revised FN plots for dam—for existing dam, post final improvement options, and post early stage improvements
January
2019
03
Event: Business Queensland to lead Paradise Dam Improvement Program Detailed Business Case.
Action: Review and planning of two preferred options from the PBC
June
2018
04
Event: Preliminary Business Case (PBC) for the DIP
Action: Completed
May 2015 to August
2017
05
Event: Stage 2 Dam Improvement Project (DIP) works
Action: Completed ($32.6M)
June
2016
06
Event: Revised Dam Safety Review. Comprehensive Risk Assessment (CRA)
Action: Completed
• Identified similar risks and proposed staged improvement works
• Incorporated additional studies since the 2015 CRA, identified potential shear failure
April
2016
07
Event: Revised Dam Safety Review
Action: Completed
May
2015
08
Event: Stage 2 Dam Improvement. Project (DIP) works
Action: Commenced
October 2014– January 2015
2014
09
Event: Comprehensive Risk Assessment (CRA)
Action: The CRA assessed increased dam risks and placed the dam above the Australian National Committee on Large Dams (ANCOLD) Guideline Limit of Tolerability for failure Structural and non-structural improvements were incorporated into Sunwater's Portfolio Risk Assessment
October
2014
10
Event: Dam Safety Review
Action: Completed
2013
11
Event: Damage by Tropical Cyclone Oswald
Action: Repair work completed ($34.2M)
December 2010–April 2011
2011
12
Event: Three major flood events:
• December 2010
• January 2011
• March 2011
Action: Minor structural damage. Plans for rectification works were made following inspections of the dam.
November
2005
13
Event: Paradise Dam built