Paradise Dam

Question and Answers

July 2021

The information contained in this document is a summary of questions asked of Sunwater during presentations by Sunwater and Natural Capital Economics (NCEconomics) to stakeholders in April and May 2021. NCE was engaged to undertake the demand study by the Department of Regional Development, Manufacturing and Water (DRDMW).

Questions asked of Sunwater

Question	Answer
Yield	
What is the difference between the Burnett Water and other water sold from the Bundaberg Water Supply Scheme (BWSS)?	Burnett Water Pty Ltd (BWPL) was set up by the State Government in 2001 to progress much needed water infrastructure in the Wide Bay-Burnett region. BWPL became a subsidiary company of Sunwater on 16 December 2005 after Sunwater bought all the shares in the company from the Queensland State Government. The water infrastructure construction projects developed by Burnett Water were Paradise Dam and Kirar Weir. The Queensland Government sets irrigation water prices for the BWSS, based on recommendations from the Queensland Competition Authority. This excludes irrigation water prices related to allocations created by the construction of Paradise Dam and Kirar Weir (i.e. Burnett Water), which are set by Sunwater. Prices for industrial and urban customers in the BWSS (including allocations created by Paradise Dam and Kirar Weir) are set by Sunwater. Water pricing information for both Burnett Water and other water in the BWSS is available here.
Water use and hydrology	
How does historical usage compare to sales?	Usage data for the full BWSS is available at: www.sunwater.com.au/water-data/report-statistics. Sunwater will prepare graphs showing usage data for the two sub-schemes when resourcing allows (this requires resources currently utilised on end of water year activities).

Question	Answer
Is there more water available in the catchment than accounted for in the current infrastructure?	The Water Plan (Burnett Basin) 2014 states a number of unallocated water reserves spread across the basin. There is 15,295 ML set aside for future infrastructure in the BWSS. This is nominally set aside for (but not restricted to) a future raising of Ned Churchward Weir.
Is the original hydrologic modelling from when Paradise Dam was constructed available?	Under the provisions of the *Water Act 2000*, DRDMW prepares Basin Water Plans based on hydrologic models known as Integrated Quantity and Quality Models (IQQM). The Burnet Basin Water Plan was originally released in 2000 and was based on hydrologic modelling undertaken at the time. In relation to Paradise Dam, the department responsible for regulation of the Water Act (now known as DRDMW) undertook further hydrologic modelling to inform the development of the Burnett Basin Resource Operations Plan (ROP) released in November 2005 (revision 4). Chapter 6, section 6.2.4 of the ROP states the volume of allocations to be released following the construction of Paradise Dam. The Water Plan was replaced in 2014, based on an updated IQQM which effectively extended the hydrologic modelling range from 1997 to 2008 (i.e. incorporating more recent historical data, compared to the earlier model). The Water Allocation Security Objectives (WASOs) have not changed.
Burnett Basin Water Plan	
When is the Burnett Water Basin Water Plan due to be reviewed?	Water Plans are reviewed at least every five years. At 10 years the Minister may extend, amend, or replace the water plan. The last review of the Burnett Basin Water Plan was undertaken in 2019.
Reliability	
How does Sunwater define reliability? Growers think of reliability as the announced allocation (AA).	The Burnett Basin Water Plan 2014 (the water plan) is supported by the DRDMW's IQQM with a simulation period based on over 100 years of climatic and stream flow data (from 1890 to 2008). The performance indicator used to access/set the **reliability** of a water allocation in the BWSS is the **monthly supplemented water sharing index**. This statistical measure is defined as the percentage of months in the IQQM simulation period in which the *allocations are able to be fully supplied*. Water allocation modelling is always based on full utilisation as is the right of the water users, i.e., assuming the scheme is fully committed (all allocations sold) and all customers take their full allocation. The Water Plan specifies the maximum allocations that can be provided by the scheme, based on IQQM modelling, to meet the Water Plan's nominated performance indicators (including the monthly water sharing index reliability) for each water product (high priority and medium priority). *Allocations are fully supplied* – this does not mean 100 per cent AA but is based on an assumed monthly water use demand pattern (based on historical usage). In the BWSS the

Question	Answer
	demand pattern assumes slightly higher use through the summer months and the reverse during winter months. The water plan defines the water allocation security objectives (WASO) which underpins the reliability of all water allocations in the BWSS. • For the high priority (HP) water allocation group, a minimum long-term monthly reliability of 99 per cent. • For the medium priority (MP) water allocation group, a minimum long-term monthly reliability of 90 per cent. A 90 per cent reliability means that if we looked back over the water plan simulation period (1 July 1890 - 30 June 2008) the assumed monthly demand would be possible 90 per cent of the time (e.g. of 1416 months in the simulation period, water would be available [as per the assumed monthly water use demand pattern] to medium priority water users for 1274 of those months). This assessment of maximum allocations that are able to be provided by a water supply scheme to meet a minimum monthly performance (water sharing index reliability), as defined in the Water Plan and in accordance with IQQM modelling and based on historical data, is different to the AA process. The AA calculation determines the per cent of customer allocations that can be provided for the current water year, commencing at the start of each water year, and as progressively revised through the year (based on current status, and pending inflows). The IQQM incorporates the water sharing rules (announced allocations) in testing the WASO against the performance indicator. It is also important to note that by nature, supplemented water allocations have two components. One being the storages (dams and weirs) that store and supply water (supplementing streamflow) and the catchment hydrology which provides the base streamflow.
What is the reliability in the BWSS? Reliability is critical for tree crops as long term investments could be lost if there are periods with no water. Reliability is described as high even if we have months of low allocations.	<u>Plan reliability</u> The Burnett Basin Water Plan defines the water allocation security objectives (WASO) which underpins the reliability of all water allocations in the BWSS: • For the HP water allocation group, a minimum long-term monthly reliability of 99 per cent. • For the MP water allocation group, a minimum long-term monthly reliability of 90 per cent. The 90 per cent MP reliability is based on full utilisation in the scheme. <u>Modelled reliability</u> The reality is that the actual reliability (or "modelled reliability") has been artificially higher than 90 per cent (i.e. 93-95 per cent) because of the large volume of unsold allocations from Paradise Dam. On completion of the Essential Works, and with the 2020 change to water-sharing rules in place, the modelled reliability was maintained.

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	As required by the Burnett Basin Water Plan, the full utilisation model has been used to conduct the hydrology work for the Detailed Business Case. This work ensures that the modelled reliability is maintained under each of the dam options being considered. Growers can consider a mix of water products (MP and HP water allocations) to suit their cropping needs.
Has reliability changed in the Burnett River Sub-scheme since Paradise Dam was built?	As noted above, the modelled reliability has been artificially higher because of the unsold allocations, but the actual plan reliability has not changed.
Will reliability be as good if smaller storage structures are used to replace any permanently lost capacity from Paradise Dam?	The investigations into alternative storages have been conducted assuming a continuation of the existing, or modelled, scheme MP and HP reliability. This exceeds the plan MP 90 per cent reliability and maintains the HP 99 per cent reliability. Generally speaking, larger storages are more resilient and better able to cope with prolonged dry periods. However, the total yield (supply allocations for both HP and MP) that can be provided by a storage at a given location is a function of both its size, and the reliability it needs to achieve. For a storage of a given size, the assessed yield it can provide (to supply customers) will therefore be determined based on the required reliability (for both HP and MP water products, as noted above). This is considered in conjunction with other supply sources in the scheme. If additional yield (supply) is required to meet future customer demand, then the storage size will need to increase, or additional storage(s) will be required. This is calculated to meet a specified reliability. In other words, to ensure consistency, the total yield that can be provided by each alternate storage option has been assessed such that they meet or exceed the minimum Water Plan reliability performance (water sharing index), and are equivalent to recent years historical performance from the scheme (with Paradise Dam and prior to the Essential Works). This is based on the IQQM modelling and reliability definition as discussed above.
Carryover	
Can high priority (HP) allocations be carried over to the next water year?	No. Only MP allocations can apply for carryover.
Announced allocations (AA)	
Where can I access information about how AA calculations are made?	Operational reports are available under the “Announced Allocations” heading on this webpage. These describe the parameters used in making an AA.
Can Sunwater share information about AA’s prior to 2002?	Announced allocation data dating back to 2002 is available here. Sunwater was created in October 2000 and does not have access to AA information prior to 2002.
Growers need to make decisions throughout the water year. Critical decisions are made in spring on the basis of what allocations are at that point in	Comment acknowledged. When calculating AAs, Sunwater must comply with the conditions set out in the BWSS Resource Operations Licence (ROL) and the BWSS ROL Operations Manual.

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time. If AA's increase in the last quarter growers can't adjust plans, but Sunwater says reliability has been met. This doesn't tell the true story.	
Is rostering being considered to cope with irrigation channel capacity constraints due to changing demand?	For the distribution schemes, rostered flow rates on outlets formed the design basis for the irrigation scheme and rostering was adopted in the early years of operating the schemes. Utilisation of the roster system was subsequently abandoned as the scheme was able to meet on demand type irrigation of cane lands without rostering. Rostering imposes a significant strain on irrigation practices of current crop types and requires greater operational surveillance. Sunwater understands that customers' preference is not to use rostering and any implementation on a permanent basis would require a significant resource investment.
Other water products	
Have other water products been considered? Tree crops need certainty of supply.	A Paradise Dam Industry Forum working group was set up to investigate whether there is value in considering a MP+ product with higher reliability and a higher cost. The group found that, as there is only a small gap between the MP and HP reliability in the BWSS, the same outcome can be achieved by purchasing extra MP water or a portfolio of MP and HP water. This may be something that is considered again in the future and may need to be considered from a perspective other than reliability. As noted above, growers can consider a mix of water products (MP and HP water allocations) to suit their cropping needs.
Channel constraints	
Will channel constraints be considered in the detailed business case process?	Yes, it is a holistic process that will make a recommendation to ensure that the two service needs of water security and dam safety are met. Note however that funding requirements and cost recovery arrangements for channel and distribution network upgrades and/or expansion, are different compared to the Dam Improvement Project works. Works to alleviate channel constraints are likely to be staged over time as required to meet growing water demands and the funding approach for these works is yet to be confirmed.
Dam Improvement Project (DIP)	
Will approvals be required for the next phase of works to strengthen and stabilise Paradise Dam (known as the Paradise Dam Improvement Project, or DIP). **Is there a possibility that those approvals won't be granted?**	Further work at Paradise Dam will largely be within the footprint of the existing dam site. As such, a full environment impact statement (EIS) is unlikely to be required. A range of approvals will, however, be required. This is likely to include state and local approvals and an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). Further strengthening and stabilisation work is necessary to meet dam safety guidelines. Once the scope of work is confirmed, impacts will need to be assessed and mitigation

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	measures developed. Approvals are likely to incorporate specific detailed conditions. Those details are not yet known. Approvals would be required for any new alternative storages.
Can water from Paradise Dam be shared beyond the scheme to areas such as Elliott Heads?	During engagement about the proposed water-sharing rule change in early 2020 (to maximise allocations to existing customers whilst works are underway at the dam), customers provided firm feedback that they did not want to see water taken out of the scheme to service other regions.
Is raising Paradise Dam beyond the original full supply level being considered?	No, that was not one of the options to be considered in the detailed business case. Significant work will be required to meet dam safety objectives at a full supply level.
Will it be cheaper to build an alternative storage or to raise Paradise Dam back to the full supply level?	Significant work is required to meet dam safety requirements, regardless of the ultimate spillway height. The options assessment will consider the best option to meet dam safety and water security requirements taking that into account. Initial work suggests that cost per megalitres of yield gained is cheaper to provide at Paradise Dam than at a new alternative storage.
Are smaller storages less cost-effective (cost per megalitre) than raising Paradise Dam?	Yes.
Will customers have to pay for the cost of the DIP works?	No.
When will the DIP works be constructed?	The Queensland Government has advised it will decide on the options analysis by the end of 2021. This will enable the detailed business case to proceed in 2022 based on this decision, including preliminary design, environmental assessment, detailed cost estimating, and various other studies. The detailed business case will be submitted to confirm total project funding approval by government. Following business case and funding approval, procurement activities can be progressed to award a construction contract, finalise planning and detailed design, and undertake construction. The construction phase of the Paradise DIP remediation works is expected to take at least three dry seasons.
If Paradise Dam is not returned to the original full supply level, will the DIP engineering works be conducted in a way that maintains the opportunity for a spillway height increase in years to come?	Yes, to the extent practical and possible, though noting that any staged or subsequent DIP works to raise the level again would not be as cost effective as undertaking the works as one activity.
Will further water releases be required for the DIP works and what impact will that have on AA?	With the completion of the lowering activity at Paradise Dam, Sunwater no longer needs to conduct water releases to maintain a safe working environment, for the period up to commencement of DIP construction. The dam is now able to fill to the temporary crest level. When activity on site commences for the DIP works a reduced supply level will again be required. There is potential that water releases may be required during the DIP works. This will depend on the activities required and prevailing weather conditions at the time and will form part of the detailed project planning once the final scope of work

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	is determined. Sunwater is very conscious of the need to mitigate impacts on customer supply, while providing a minimum temporary storage level reduction to ensure construction can safely proceed, considering warning time for demobilisation (for overtopping events) and workplace and dam safety requirements.
Dam safety	
Are the dam safety objectives fixed or open to interpretation?	The two key dam safety drivers are: • Limit of Tolerability (LoT) – this is not a static measure and needs to accommodate dam failure assessment and probabilities for different events and flood sizes, and the consequence of dam failure (loss of life and impacts), including expected population growth over time. The DIP scope needs to take that into account. This assessment follows a defined process. • As Low As Reasonably Practical – the recommended design option needs to demonstrate that dam failure risks have been reduced as low as reasonably practical. This includes an assessment of when the cost of further potential improvement works is disproportionate compared to the calculated benefits achieved (by reducing the probability and potential cost and impact of dam failure events). This also follows a defined process. These principles and supporting requirements are as specified in the Australian National Conference on Large Dams (ANCOLD) and Queensland Government Guidelines, Design Standards and Legislation.
Water sales	
When will water be available for sale?	All unsold allocations (both MP and HP) from Paradise Dam located in the Burnett River have been quarantined to maximise AA's for existing water allocation holders. There is also approximately 17,000 ML MP of Burnett Water Pty Ltd allocation unsold in the Kolan sub-scheme which at this point in time is unable to be sold as it will impact on existing customers in the Burnett sub-scheme. Once a decision on the future of Paradise Dam is known Sunwater will be in a position to confirm the volumes available for future sale. Sunwater will not be able to sell permanent water until the DIP works are complete. We will re-engage on the rule change once the DIP scope is confirmed. It is expected that the temporary transfer market will be very active until permanent water is again available for sale. This fact sheet has information about the volumes of water that would be available for sale under the spillway heigh options being considered.
When was HP water last available for sale in the BWSS?	MP and HP water has been available for sale from Paradise Dam since it was built and up until the need for the Essential Works was confirmed in 2019. In March 2020 a change to water-sharing rules was made to quarantine the unsold allocation to maximise water for existing customers whilst works are underway at the dam. A tender process was initiated in 2017 and 2018 to encourage water sales, but both MP and HP water had always been available for sale outside the tender process.

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Where can information be accessed about the trading zones within the BWSS and the caps on trading for each zone?	This link takes you to Queensland government information about the zone caps in the Bundaberg Water Supply Scheme: business.qld.gov.au/industries/mining-energy-water/water/water-markets/current-locations/bundaberg.
Can water traders be precluded from the next water sale or can it be limited to existing allocation holders?	One of Sunwater's key mechanisms that ensures fairness in the trading process is the use of an independent water broker, Ruralco. In accordance with our Water Trading Ringfencing Guideline, Ruralco is physically and digitally removed from all information relating to Sunwater's business to ensure that market sensitive information is not utilised in trading activities.
Suggestion that Sunwater provides an investor briefing.	Sunwater is happy to arrange an investor briefing once a decision on the spillway height has been made. The Queensland Government is expected to make a decision by the end of 2021.

Questions

Please contact us on 3120 0270 or paradise.dam@sunwater.com.au with any questions.