

Paradise Dam Essential Works

Technical Q&A

May 2020

Below is a list of commonly asked questions and comments from Sunwater customers and community members. If you have a question that is not listed below, please contact Sunwater on 07 3120 0270 or paradise.dam@sunwater.com.au. We are happy to arrange meetings to discuss any concerns you may have.

#	Question	Sunwater Response
1	What is the timing for the Essential Works to be commenced and completed?	Works to lower the dam spillway commenced on 25 May and are scheduled to be completed by December 2020. If there are significant unexpected delays, we may need to finalise the Essential Works beyond this wet season, but the plan is for completion this year.
2	Local grower groups commissioned a report by Rizzo International. Can the investigations proposed by Rizzo (6 block samples and 30 core samples) be sampled and analysed before the Essential Works are commenced, or completed?	<p>Sunwater must act now to lower the dam spillway to improve its stability and protect the safety of downstream communities.</p> <p>Sunwater and Building Queensland will work together over the coming months to:</p> <ul style="list-style-type: none"> • develop a 3D geological model and geotechnical assessment of the dam foundations (currently underway) • carry-out further sampling and testing of the primary spillway’s roller compacted concrete (RCC) • conduct an anchoring trial to confirm existing dam foundation capacity (currently scheduled) • refine option designs and cost ranges using this updated information. <p>The additional geotechnical assessment, sampling and testing that has been recommended will be undertaken in parallel with the Essential Works – this testing and analysis will take many months and cannot be completed before the Essential Works. We aim to have results from this testing by late 2020 but there are detailed logistics to work through in relation to the testing and analysis.</p>
3	Dr Rizzo says the sampling can be done on the secondary spillway to give an indication of what’s in	Sunwater is of the view that the best way to understand the condition of the RCC concrete in the primary spillway is to take samples from the primary spillway.

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	the primary spillway, without needing to reduce the spillway. Is this correct?	<p>We plan to take 16 block samples will be taken from the primary spillway and secondary spillway and they will be sent to a Newcastle laboratory for analysis.</p> <p>The only effective way to test the primary spillway is while we are doing the Essential Works. Different samples can then be taken at different depths, different diameters across different sections.</p>
4	Can the mitigation works proposed by Rizzo (indicated to be multiple post tensioned anchors) be undertaken before the next wet season?	<p>No. Sunwater will conduct an anchoring trial in parallel with the Essential Works to confirm existing dam foundation capacity. Anchoring cannot be reliably planned without the results of that trial, and updated geological modelling.</p> <p>Anchoring would be a significant undertaking at Paradise Dam and is estimated to require up to approximately 100 anchors across the primary spillway, of 90 metres length, and including a strengthening beam constructed into the crest and along the length of the spillway – this would take approximately two years to complete. Dr Rizzo recommended a smaller anchoring scope.</p> <p>It is important to note that anchoring is not common on RCC dams, and there is no known precedent of this scale. In addition, anchoring the primary spillway would address only one of three possible significant failure risks at Paradise Dam, and is not as effective or feasible in the short term compared to lowering the spillway. Anchoring would need to be implemented as part of a larger, more complete Dam Improvement project that addresses all dam failure risks (or alternatively, mass concrete buttressing), amongst other improvement works.</p>
5	Will the Essential Works activities involve removing 5.8 m at a time in sections or is there multiple smaller reductions over the entire length of the spillway?	<p>The Essential Works construction methodology involves progressing activities and work zones from the left abutment to the right side of the dam (looking downstream). It will be initially focussed on cutting and removing the reinforced concrete crest on the primary spillway at the left abutment end, then expanding across the spillway width with multiple work fronts as lowering progresses. The spillway will be progressively lowered with the leading work fronts removing the concrete crest, following crews removing the RCC layers and trailing work fronts installing strengthening anchors (dowel bars) and reconstructing a temporary crest at the lowered level.</p>
6	Can the Essential Works be suspended mid way, at 2m for example, if it becomes apparent that the RCC is in better condition than anticipated?	<p>No.</p> <p>It is important to note that Dr Rizzo’s analysis only assesses the risk of dam failure caused by the condition of the RCC lift joints (item 1 in the table below).</p> <p>This is insufficient as it fails to account for other issues that contribute to the overall dam failure risk as presented in the table below (and outlined in technical reports released publicly in November 2019).</p>

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		<table border="1"> <thead> <tr> <th>Issues that contribute to the dam failure risk</th> <th>Risk contribution</th> </tr> </thead> <tbody> <tr> <td>1. Sliding / overturning on monoliths through RCC</td> <td>53%</td> </tr> <tr> <td>2. Undermining on spillway monoliths due to overflow scour, loss of apron or scour at toe</td> <td>42%</td> </tr> <tr> <td>3. Sliding / overturning on secondary spillway monoliths through the foundation</td> <td>5%</td> </tr> </tbody> </table> <p>Given the impact a dam failure would have on the lives and livelihoods of the downstream community, including customers, it is important decisions are made following a robust analysis of all the issues involved.</p> <p>Results from RCC sampling, which is planned to occur progressively as the lowering work allows access to different sections and levels of the spillway, will take time to undertake. The work includes collecting samples, laboratory testing and a revised assessment of RCC strength. The results will then need to be incorporated into updated dam stability calculations. A full assessment, including a peer review, will need to be conducted before any change to the Essential Works scope could be made.</p> <p>Sunwater could not pause the Essential Works at any interim level for several months, leaving it in an incomplete state, to await these results. Nor can Sunwater alter the Essential Works scope based on a subjective assessment only. The Essential Works are required to reduce risk as soon as reasonably practical, following detailed assessment and peer review by various experts. In parallel, work will progress to assess long term options and determine the final Dam Improvement Project scope and design.</p>	Issues that contribute to the dam failure risk	Risk contribution	1. Sliding / overturning on monoliths through RCC	53%	2. Undermining on spillway monoliths due to overflow scour, loss of apron or scour at toe	42%	3. Sliding / overturning on secondary spillway monoliths through the foundation	5%
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7	<p>The Rizzo Report states on p25 "...RIZZO results indicate that an event having a recurrence interval on the order of 1000 years would have to occur before major distress would occur." How does this compare with what the dam was originally designed for and what is required in current dam safety standards?</p>	<p>Sunwater does not agree with this statement. Paradise Dam is likely to be unstable at flood levels similar to the 2013 event (i.e. a one in 200-year event).</p> <p>The risk of failure at Paradise Dam is significantly above the Australian National Committee on Large Dams (ANCOLD) limit of tolerability and we are acting to reduce this risk as soon as reasonably practicable.</p> <p>The issues at Paradise Dam have been subject to extensive investigations carried out by Sunwater and independent engineering advisors over seven years. These findings have been reviewed by both national and international experts.</p> <p>The ANCOLD Guidelines require that the life safety risks for a dam associated with dam failure scenarios be calculated and plotted against the limit of tolerability as noted above.</p> <p>The original design basis for the dam was to safely pass a 1 in 30,000 year flood event. For a major dam situated upstream of communities, to fail or be close to failure for a 1 in 1,000 year flood event would typically</p>								

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		<p>be completely unacceptable. By comparison, Paradise Dam is likely to be unstable at a one in 200-year flood event.</p> <p>In addition, it is worth noting that Queensland has experienced a number of flood events within the last ten years that have reached at least a 1 in 500 year flood event.</p>
8	Does the Rizzo report address all of the dam safety risks?	No. It addresses just one out of three possible dam failure risks, which make up about 50% of the total risk. Please refer to question 6 above for more information.
9	Do the Rizzo recommendations meet ANCOLD and Qld Dam Safety regulatory requirements?	No. The Rizzo report does not address all dam failure risks.
10	How will the irrigator community be involved in the planning for the dam's remediation?	<p>Sunwater is working with Building Queensland to provide a firm recommendation to the Queensland Government on the future of Paradise Dam and water security in the region. This process will look at all available options, except one. Decommissioning Paradise Dam has been ruled out.</p> <p>Sunwater is committed to working with stakeholders throughout this process and to further identify and determine the viability of alternate water storage options, if required to meet future demand within the Burnett River region.</p> <p>Since September 2019, Sunwater has been engaging with customers and the community about the importance of lowering the dam spillway, water allocations and long-term water security for the region.</p> <p>There are three engagement forums where information is shared, and the voices of the irrigator community can be heard:</p> <ul style="list-style-type: none"> - the Paradise Dam Community Reference Group (CRG) - the Burnett Catchment Industry Forum (BCIF) and - the Bundaberg Water Supply Scheme Irrigator Advisory Committee (IAC). <p>The BCIF has established working groups on the topics of:</p> <ul style="list-style-type: none"> - Intermediate water product - Economic assessment assumptions - Alternate storage options <p>The working groups have been tasked with undertaking detailed issue-specific work, including the development of proposals that can be presented to the BCIF for review and endorsement.</p> <p>Sunwater has been providing regular updates and information to the wider community and our customers via drop-in information sessions, letters, advertisements, shed talks, kitchen table meetings and community newsletters. We have a dedicated project webpage and are</p>

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		<p>also sharing information via social media on a new Paradise Dam Facebook page.</p> <p>The Department of Natural Resources, Mines and Energy (DNRME) has approved an amendment to water sharing rules that will enable Sunwater to maximise allocations in the region commencing 1 July.</p> <p>We encourage anyone who has any questions or concerns to get in touch with us. We are also happy to consider any suggestions on how we can best share information and engage with customers and the community.</p>
11	<p>If capacity is reduced in Paradise dam, what is the timeframe for this storage capacity to be replaced and what is the preferred location for the replacement storage capacity?</p>	<p>A preferred location has not been confirmed. Sunwater started investigating alternate storage options through the development of its Burnett Regional Blueprint in late 2019. This work will now be enhanced, with a particular focus on identifying suitable sites in the Burnett River sub-scheme to provide additional water storage capacity to meet future demand.</p> <p>Sunwater will be working with local stakeholders and will provide this information to Building Queensland as it determines the best long-term option for Paradise Dam. The Burnett Catchment Industry Forum working group (see question 10 above for more information) will be involved on this matter in an in-depth way and information on preferred locations, sizes etc will come through that group and the BCIF over the coming months.</p> <p>Regarding the timeframe, the Queensland Government has stated it is essential that water availability is maintained ahead of demand.</p>
12	<p>If the Dam stood up against the record 2013 flood, why will it fail now? Why the sudden rush?</p>	<p>It is important to note that previous performance does not indicate future performance.</p> <p>Previous floods resulted in significant damage to Paradise Dam. Repair work was carried out in 2013 (\$34.2 million) and in 2017 (\$30.6 million). Sunwater conducted various phases of investigations from 2013 to 2015. Geotechnical work undertaken in 2019 clarified an issue with the bonds in the layers of roller compacted concrete, resulting in a revised stability assessment. Since this serious issue was identified, Sunwater's primary focus has been to plan Essential Work to reduce the risk of dam failure and improve community safety as quickly as possible, before the next wet season.</p> <p>Lowering the spillway is the fastest way to reduce the risk to downstream communities and can be done without significantly impacting existing customers' access to water.</p>
13	<p>The Dam experts who gave evidence at the Commission of Inquiry said the dam failure risk has been</p>	<p>The technical reports that led to Sunwater's decision to lower the dam for safety are available at: www.sunwater.com.au/projects/paradise-dam-essential-works/technical-reports/</p>

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	<p>overstated by Sunwater and the Minister, and do not believe the Dam needs to be lowered. Why are you not listening to these experts?</p>	<p>As the operator of the dam, Sunwater has an obligation to protect lives, properties and livelihoods. Doing nothing is not an option.</p> <p>Not one engineer who gave evidence at the Commission of Inquiry was willing to guarantee 100% that Paradise Dam is safe.</p> <p>Sunwater notes the following statements from the Commission of Inquiry Report:</p> <p><i>5.439 - As indicated previously, the experts who gave evidence on this issue are divided in their opinions on which assumptions are most reasonable when analysing the sliding stability of the dam. The current owner of the dam, however (Sunwater) has decided its risk appetite, which would seem to be consistent with GHD's view of the matter. This presents as a reasonable position for a public body to adopt in connection with a Dam that lies upstream from a residential community.</i></p> <p><i>6.27 - According to a report by SunWater Limited (SunWater), the damage to the apron and the areas immediately downstream of it created risks that were 'above the limit of tolerability'. John Young, a geotechnical engineer who was a member of the 2019 TRP, described the scour as 'very serious', adding, '[i]f the flood in 2013 had persisted for a significantly longer period of time, erosion could have worked its way to the dam and started to undermine the rock under the dam'.</i></p>
14	<p>Sunwater built the Dam. People who worked on the Dam and locals knew there were problems with its construction back then. Can Sunwater be trusted to fix it? And who is the contractor on the Essential Works? How much is this costing us, and will it increase water prices for farmers?</p>	<p>Paradise Dam was designed and built by the Burnett Alliance in 2005 under the direction of Burnett Water Pty Ltd. Burnett Water became a subsidiary company of Sunwater in December 2005 after the Dam was constructed. Sunwater is a State Government Owned Corporation. Sunwater's annual budget covers the cost of operating and maintaining the infrastructure, and delivering water to customers. Capital expenditure must be approved and allocated by the State Government.</p> <p>The Essential Works will cost approximately \$100 million. The costs of the Dam Improvement Project will not be determined until all design works and tender processes are complete, but the cost will be substantially less than building a new dam.</p> <p>Sunwater has selected major construction company CPB Contractors to undertake the Essential Works. The firm was selected after a rigorous procurement and due diligence process highlighted a proven capacity to efficiently and effectively deliver complex projects of this type and size.</p>
15	<p>The Dam was built in the wrong place to begin with. Why can't you just build a new dam in front of it and knock the current one down? Why are you wasting more money and time on testing?</p>	<p>Options to construct a new dam elsewhere on the Burnett River or another river within the broader catchment have been investigated previously, but ruled out due to cost and environmental impacts. The cost of building a new dam would be prohibitively expensive.</p> <p>The Building Queensland detailed business case process currently underway will look at the complete picture and allow us to develop a holistic solution and accurate cost for the long term Paradise Dam</p>

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		Improvement Project. Remediating a dam is not a simple process and it must be done right.
16	Why did Sunwater say the Dam is being lowered by 5m, when it is in fact 5.8m? And what impact will this have on storage capacity?	The total lowering for the Essential Works has been confirmed as 5.8 metres. This Fact Sheet shares information about the engineering need for the 5.8 metre lowering, the timeline for that decision and what that means for customer water availability.