



LEVEL

TWENTY SEVEN

CHAMBERS



Paradise Dam Commission of Inquiry

Final Report Notes
June 2020

On 21 May 2020, the Queensland Government published the final report of the Paradise Dam Commission of Inquiry's findings. A copy of the report can be accessed [here](#).

Background

The Paradise Dam Commission of Inquiry was established to examine the root cause of structural and stability issues identified with the Paradise Dam near Bundaberg. Its focus was to determine if, and to what extent, the governance, processes and systems involved in the design, construction or commissioning of the Paradise Dam contributed to structural or stability issues identified in particular engineering and technical studies.

The Dam

The principal building material for the Dam was roller-compacted concrete (RCC). The critical design parameters were values influencing the shear strength of the lift joints formed between consecutive layers of RCC (cohesion and friction coefficient or friction angle). The designers adopted values of the design shear strength parameters on the advice of an RCC advisor.

As designed, the Dam's shear strength also relied upon some cohesion from 'bedding mix' inserted between lift joints. While the friction angles adopted were conservative according to industry guidelines, the cohesion values were not. Despite the relatively high adopted cohesion values, the RCC was not tested in a laboratory or in situ during design or construction to determine if the design values could be achieved. Without confirmation testing, assessing whether the design parameters had been met relied on the construction quality assurance program.

In 2015, testing of core samples retrieved from the Dam called into question whether the design values had been attained. Despite further testing since 2015, doubts remain about whether the assumed design values of friction angle and cohesion have been achieved in the Dam as-constructed.

The Findings

The Commission found that the Dam's stability is uncertain in flood events more severe than those experienced in 2011 and 2013.

Root causes of uncertainty as to instability

The Commissioners found that the differences among the experts about stability accounted for the uncertainty as to the Dam's stability, along with:

- the absence of testing for shear strength of the lift joints by the members of the building and design alliance;
- the use of a lean mix RCC which is more difficult to work with and less forgiving than a higher cementitious mix and which is difficult to reliably sample and test; and

- the absence of a proper peer review of the RCC aspects of the design (including the mix and its material properties). The Commissioners observed that a better peer review process would likely have identified that the design values for cohesion were not conservative and recommended a more conservative design or that confirmation testing be done.

Possible causes of instability if it exists

The Commissioners observed that expert opinion is that more testing is needed to resolve the doubts about stability, and that Sunwater intends to conduct further testing.

The Commission identified two possible explanations for any instability:

First, the RCC mix may intrinsically have been incapable of meeting the design values – particularly the less conservative cohesion assumptions.

Secondly, all construction quality problems may not have been remediated. The Commission noted that, while the quality assurance procedures were generally effective in identifying quality issues and in ensuring their remediation, the primary means of detecting lift joint problems, the "Lift Joint Quality Index", was applied in ways that masked deficiencies that it was supposed to detect. Accordingly, unremediated problems may have prejudiced the bonding at lift joints to such an extent that the Dam has not attained the design parameters for friction or cohesion.

The Commission made a series of recommendations, including:

- The materials used to construct a dam and the dam as-built should be subjected to inspection and physical testing to confirm the values adopted for critical design parameters.
- The Regulator ought to mandate the independent technical review of referable dam projects to ensure they are designed, constructed and commissioned to acceptable standards.
- The designer of a dam should give proper consideration to the erosive force of water and the capacity of the riverbed to withstand such force, which involves managing the interaction between geotechnical engineers and hydraulic engineers.
- The Regulator should consider suitable means of routinely monitoring compliance with conditions of development permits and other approvals relating to the construction of dams, including by audits and checks during construction.
- To the extent practicable, the entity that is ultimately to own or operate the dam after its commissioning should have an opportunity to influence its design and construction; and if there is an alliance, preferably as part of that structure.

Members of Level Twenty Seven Chambers appeared for both parties.

GHD was represented by:



NICHOLAS ANDREATIDIS QC
T +61 7 3008 3967
E ANDREATIDIS@LEVEL27CHAMBERS.COM.AU



SOPHIE GIBSON
T +61 7 3008 3962
E SOPHIE.GIBSON@LEVEL27CHAMBERS.COM.AU

Golders Associates was represented by:



ROB ANDERSON QC
T +61 7 3236 3232
E R.ANDERSON@LEVEL27CHAMBERS.COM.AU

THE VIEWS AND OPINIONS EXPRESSED IN THIS ARTICLE ARE
THOSE OF THE AUTHORS AND DO NOT NECESSARILY REFLECT
THOSE OF OTHER MEMBERS OF LEVEL TWENTY SEVEN
CHAMBERS.

Legal Updates

To stay updated with the latest legal developments register for upcoming events and publications from Level Twenty Seven Chambers via our [website](#):

<https://www.level27chambers.com.au/register-seminars-publications/>

Level Twenty Seven sends marketing communications to those who have either, 1) consented to the processing of their personal data for such purposes; 2) provided their details in the course of the sale or negotiations for the sale of services and we believe the communication is of legitimate interest. If at any time you do not wish to receive notifications regarding publications or events from Level Twenty Seven please email [Practice Management](#) who will update Chambers' records immediately.