

Memorandum

To Dan Spiller, GM Asset Portfolio Development & Delivery

From Barton Maher, Principal Storage Planning
Brett Myatt, Manager Asset Planning

Date 18 December 2014

Subject QCA draft report response: Somerset Dam Stabilisation Project

| | |
|------------------|---|
| CH2MHill Comment | Efficiency - The primary driver has been demonstrated, and the project is supported by a clear, consistent and transparent decision-making process to date. Proposed scope of works appears reasonable and standard of works are in line with industry good practice. However, CH2M HILL notes that insufficient evidence has been provided to support the cost estimate of \$72 million. |
|------------------|---|

Summary

The Somerset Dam Stabilisation Project \$72M (spend FY27) needs to be considered in conjunction with the Somerset Concrete Abutment Apron project (\$46M, spend FY20). This is in light of new material information which has been received since the July 2014 submission. Seqwater believes this new information should be included in the final QCA recommendations. Please note that:

- The two projects (which can be constructed independently) combine to provide the necessary works to meet the dam safety compliance obligations.
- The concrete abutment protection project provides greater risk reduction than the stabilisation project. However both projects are required to provide the necessary risk reduction to meet regulatory dam safety requirements.
- Based on the current approved flood manual, the required design flood level for the Somerset Dam upgrade is Elevation Level (EL) 113.50m based on the Australian Height Datum (AHD).
- This represents an overall saving to the combined projects of \$59M.

Background and Context

Core documents that provide evidence of the \$72M cost estimate included in the original submission are:

- Reference 1 - Somerset Dam Concept Design Review for Dam Raising Report, SMEC, September 2006
- Reference 2 - Somerset Dam Acceptable Flood Study and Concept Design Report, Entura, December 2011
- Reference 3 - Seqwater Dams Portfolio Risk Assessment – Dam Safety Risk Management Strategy, URS Australia, November 2013
- Reference 4 - Somerset Dam Safety Review, URS Australia, March 2014
- Reference 5 - Wivenhoe and Somerset Dams Optimisation Study Report, DEWS, March 2014
- Reference 6 - Dams and Weirs Capital Works Program, URS Australia, May 2014

References 1-6 were supplied to the QCA's consultants (CH2M Hill) during their prudence and efficiency review. A material document that has been completed since the submission is:

- Reference 7 - Somerset Dam Flood Upgrade Options Feasibility Study – Draft Interim Report, GHD, September 2014



Reference 7 was supplied to the QCA's consultants (CH2M Hill) in response to their draft prudence and efficiency report.

Efficiency

The narrative below outlines the chronology of understanding and subsequent cost evolution for these proposed investments, with the aim of demonstrating that the proposed costs are efficient. In summary these documents present:

- A study in 2006 by SMEC that considered the options to raise the storage level of Somerset Dam and provide the required flood capacity to meet regulatory requirements estimated the capital costs of the project to be \$55M (Table 8.2 of Reference 1). In response to a request from the Queensland Dam Safety Regulator following the January 2011 flood event, ENTURA were engaged to provide a revised estimate of the upgrade costs for Somerset Dam to meet the flood capacity guidelines. The outcomes of this study selected a preferred option (Option 3 in Table 5-1 of Reference 2) which included anchoring, toe protection and provision of a return channel with an estimated cost of \$52.8M (Reference 2 - Table 4-2 and Table 4-3). This pre-feasibility stage estimate did not include owners and detailed design costs.
- The Portfolio Risk Assessment (PRA) Dam Safety Risk Management Strategy based on the assessed risk assumed that the return channel for the upgrade of the dam was not required and that the apron slab (ENTURA Option 2) would be adequate to reduce the risk at Somerset Dam. This was assigned a budget planning estimate of \$40M (Reference 3 - Appendix A Risk Reduction Options – Somerset Dam).
- In 2013 URS were engaged to undertake a Dam Safety Review for Somerset Dam to meet the dates specified in the 2009 Dam Safety Conditions issued by the Department of Energy and Water Supply (DEWS). The safety review specifically addressed some of the key recommendations from the previous studies including the development of a geotechnical model for the foundations, a review of the dam stability and a review of the erosion potential for the foundation. Key issues identified by the Dam Safety Review which impact on the flood capacity upgrade cost estimate from the PRA are:
 - The likely erosion of the toe of the dam during overtopping and the corresponding impact of this erosion on the dam stability (Reference 4 - Section 12.6.8).
 - The inadequate stability of the dissipator floor slabs due to the revised higher upstream flood levels and the associated increased energy of spillway discharges (Reference 4 - Table 12 – 11).
 - The inadequate stability of the dissipator training walls (Reference 4 - Table 12 – 12).
 - The inadequate stability of the dam for the Maximum Design Earthquake (Reference 4 - Table 12 – 10).
 - Flood flows impacting on the crest radial gates (Reference 4 - Table 12 – 14).
- The Wivenhoe and Somerset Dams Optimisation Study (WSDOS) Report recommended that upgrade options be investigated as a matter of priority for both dams as the identified deficiencies driving the need to upgrade the dam will have a direct impact on the ability to operate the dams to provide flood mitigation (Reference 5 - Section 9.5 and 9.6).
- During the workshop with URS and Seqwater for the development of the Dams and Weirs Capital Works Program (Reference 6), it was recognised that the upgrade scope from previous studies was inadequate due to:

- The potential water level for the revised Probable Maximum Flood (PMF) estimates to be as high as EL115m AHD based on the Seqwater WSDOS modelling which was significantly higher than the previously assumed maximum water level of EL 112.00m AHD.
- No provision being made for the strengthening of the dissipator floor slabs, upgrade of the dissipator walls, modifications to the spillway radial crest gates, upgrade of the spillway sluice gates and strengthening of the upper bridge deck

Therefore the project cost estimates were divided into 2 separate projects with the downstream erosion protection and return channel being delivered as the first stage of the upgrade project to lower the societal risk below the Australian National Committee on Large Dams (ANCOLD) Limit of Tolerability. This was estimated to have a cost of \$45M based on similar projects undertaken by URS. This is the Concrete Abutment Aprons Project.

The second stage of the project for the submission included anchoring to strengthen the dam and the associated spillway upgrade works to provide the dam with the required flood capacity. This was estimated to have a cost of \$72M based on the cost data for the Lake Manchester upgrade project and similar projects undertaken by URS. This is the Dam Stabilisation Project.

The July QCA submission used the information from above (total for both projects was \$118M).

In August 2014 DEWS requested Seqwater provide more detailed cost estimates for the upgrade of Somerset and Wivenhoe Dams as part of the Flood Storage Increase Study being undertaken by the Queensland Government. GHD were engaged in late August 2014 to deliver a series of investigations and develop options to upgrade Somerset Dam to safely pass the revised design flood events from the Wivenhoe and Somerset Dams Optimisation Study (WSDOS). The draft Somerset Dam Flood Upgrade Options Feasibility Study report was received in late September 2014 along with the developed cost estimates.

This report provides a significantly more detailed engineering investigation cost estimate for the Somerset Dam Flood Capacity Upgrade, with an estimated cost for the project of \$59M (October 2014). This revised estimate includes the total cost for both the dam stabilisation and the concrete abutment components of the project.

This is a significant cost saving based on new information which was not available at the time of July 2014 submission. Note that Seqwater would have reviewed the cost estimates as part of the normal planning process, however as new information was available within the QCA's formal response period Seqwater has provided the QCA with the opportunity to incorporate the latest information into its review and recommendations.

Recommendation

Seqwater recommends the new information be accepted as efficient and the cost estimate to upgrade the flood capacity of Somerset Dam revised to the \$59M contained in the GHD report, broken down as:

- Concrete Abutment Aprons – \$46M no change
- Dam Stabilisation - \$13M

This represents an overall saving to the combined projects of \$59M.

These are the most recent estimates of the cost to upgrade Somerset Dam and have been supplied to DEWS for the Flood Storage Increase Study (FSIS) to go to Government in November 2014.

Regards,



6/1/15

Barton Maher
Principal Storage Planning

Endorsed:



Brett Myatt
Manager Asset Planning