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## Report

### Green Hills Dam

### Cost Estimate Study

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## EXECUTIVE SUMMARY

SunWater was engaged by the Department of Environment and Resource Management to determine an order of magnitude cost estimate using existing information available for Green Hills Dam located at AMTD 338.6 km on the Gilbert River. Using this existing information, SunWater has developed a Roller Compacted Concrete Dam arrangement at the site and has estimated it would cost in the order of \$350 million to develop. The confidence limits of this estimate are wide given that the developed conceptual arrangement is based upon limited information.

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## 1.0 BACKGROUND

The Gilbert River in the Gulf Savannah region of northern Queensland has been identified as having the potential to develop an irrigated agriculture industry. In 1998, a limited investigation was carried out by the Department of Natural Resources (DNR) and a report titled *Engineering Assessment of Storage Options* was produced. The investigation identified two possible damsites on Green Hills station. The proposed Green Hills Dam located at AMTD 338.6 km Gilbert River was preferred. A very preliminary estimate was prepared in 1999 for an earth and rockfill embankment dam for \$30 million and an updated cost estimate of \$95 million was prepared in 2009. Due to considerable escalations in construction costs since this time and due to the very limited nature of previous investigations the cost estimates are deemed to be under estimated.

A regulating weir downstream of the Green Hills dam was proposed downstream in previous investigations however as it has not formed part of this consultancy it has not been considered.

The Department of Environment and Resource Management (DERM) has approached SunWater to determine an order of magnitude cost estimate for the Green Hills Dam using any existing information currently available. This report sets out the findings of the study.

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## 2.0 SCOPE

The objectives of this study are to determine:

- A suitable RCC dam arrangement for the site for a 300,000 ML storage, and
- A capital cost estimate for this arrangement.

### 3.0 INFORMATION GAP ANALYSIS

The Green Hills dam-site was initially assessed in July 1998. A number of sites were inspected, limited seismic refraction surveys carried out and storage curve was developed. Relatively little information is currently available for the proposed dam site. Much of the existing information is either outdated or of very limited extent.

Table 3.1 summarises the information found during this investigation against information which would influence the cost of the dam. The summary is based on searches of SunWater's records and information provided by DERM. Other information may exist elsewhere. Additional investigations would increase the confidence in the engineering arrangements and accordingly the cost estimate.

**Table 3.1: Information Availability**

Class of Information Required to Increase Confidence in Cost Estimate	
Site Geology	Limited seismic refraction survey
Source of Construction Materials	Non-existent
Hydrogeology	Non-existent
Social Impacts	Non-existent
Property and Infrastructure	Non-existent
Native Title	Non-existent
Cultural Heritage	Non-existent
Environmental Impacts	Non-existent
Water Resource Modelling	Non-existent
Failure Impact Assessment	Non-existent
Seismic Hazard Assessment	Non-existent
Design Flood Hydrology	Non-existent
Hydraulic Modelling	Non-existent
Survey	Photogrammetry
Storage Curve	Based upon photogrammetry
Project Risk Analysis	Non-existent



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## 4.0 DAM ARRANGEMENT

A Roller Compacted Concrete (RCC) Dam has been adopted for the purpose of this study. Subsequent investigations may demonstrate that other dam types, such as a Concrete Faced Rockfill Dam or an Earthfill Dam may be more appropriate.

The Plan Foundation Line for the structure has been based on the available seismic refraction profiling. A fixed crest spillway elevation of EL 253.2 mAHD has been adopted for the dam represents a storage volume of 300,000 ML based upon the available storage curve.

As there is no available design flood hydrology, flood routing has not been carried out. A spillway width of 185m has been adopted as it appears to be an appropriate width to fit within the river section. A nominal 10.9 m freeboard has been assumed as the height from spillway crest level to abutment crest. This is in line with the freeboard assumed in previous studies of the site.

A general arrangement drawing of the structure has been developed using typical sections for the structure type chosen and is shown in *Appendix A*.

A standard outlet works and fishway has been adopted located within the left abutment adjacent to the spillway. The outlet works comprises a selective withdrawal intake structure adjacent to the upstream face of the dam, a conduit through the dam guard and regulating valves discharging into the spillway apron area. Provision for a fish passage has been included in the cost estimate but has not been detailed on the concept arrangement. A fishlift is proposed for upstream migration and a fishlock is proposed for downstream migration.

## 5.0 COST ESTIMATE

A cost estimate for the proposed structure has been developed. Where possible quantities have been taken from the drawings and unit rates applied from similar recent project work. *Appendix B* details a breakdown of the project cost estimate. An allowance for escalation over the development period has not been included accordingly the cost has been expressed in 2010 dollars. A summary of the cost estimate is presented in Table 5.1 below.

**Table 5.1: Cost Estimate for RCC Dam Arrangement**

Full Supply Level, EL (mAHD)	Cost Estimate (\$)
253.2	\$ 345,674,436

The confidence limits of this estimate will be wide given that the conceptual engineering arrangement is based upon limited information. Investigations which would greatly increase the confidence of the cost estimate are listed above in Table 3-1. These include geotechnical investigations, the development of design flood hydrology and hydraulic modelling.