SA Water

SOUTH AUSTRALIAN WATER CORPORATION

TG 21

TECHNICAL GUIDELINE

Checklist: Investigation, Concept & Detail Design of Dams

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Issue Date: 09 November 2004

Government of South Australia

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Section 1: Purpose

To be used in the Investigation, Concept and Detail Design Phases to ensure all relevant aspects of the development/upgrading of dams infrastructure are addressed.

Section 2: Background

Currently dams investigation and design involves upgrading/maintaining the present infrastructure. There are no new dams listed for construction in the foreseeable future.

Very little in-house investigation and design is currently carried out for dams and most of this work is contracted out to external consultants. In-house effort is generally limited to briefing, managing the consultant and reviewing their deliverables.

Generally all the investigation and design is undertaken by the one consultant with three sequential engagements. This checklist is designed to be used as a guide for individual engagements.

Section 3: Checklist

Item	Aspects to be Considered
Development of the Project Brief	• Review of recommendations of the PRA Report and update cost estimate. • Review of scope of project. • Current situation and operating problems identified together with operators. • Likely future developments. • Environmental considerations (including EPA requirements). • Community expectations. • Heritage considerations • Timeframe for investigation. • Agreed points of contact with SA Water.

Collection and preparation of information for the consultant	• Obtain/assess essential information eg:
	  ○ Topographical surveys
	  ○ Flood/catchment hydrologic information
	  ○ Earthquake hazardous assessments
	  ○ Geological information
	  ○ Dam break inundation map
	  ○ Construction records, Constrcution Branch Newsletters, existing drawings, specifications, dam histories associated with the project
	• Prepare any drawings, sketches necessary to describe the project.

Item	Aspects to be Considered
Site Specific issues	• Access to site for investigation • OH&S Regulations pertaining to site. • Operational constraints (eg limited time of the year available for construction) • Limitations in land use • Type and extent of site investigation.
Environmental Issues	• Investigate Issues • Can the design be altered to accommodate environmental requirements? • Produce environmental check list • Develop an environmental management plan • Approval EPA (if required)
Other Issues	• Community considerations • Heritage and indigenous sacred sites considerations • Local Government Approval (if required)

Project Brief (Stage 1 Safety Investigation)	Extent of the consultancy including the:
	• Scope of work:
	  ○ Review all available information on the dam (design, construction, operations, surveillance data)
	  ○ Carry out an inspection of the dam
	  ○ Update flood and earthquake loadings if necessary
	  ○ Assess safety (risk levels) under normal operations, earthquake, flood loading, on the basis of the available information and inspection.
	  ○ Identify potential safety issues and further investigations required to enable a definitive statement on the safety of the dam.
	• Deliverables (see below)
	• Essential information (see above)
	• Timeframe
	• Reporting procedures
	• Procedure for reviewing consultants deliverables

Consultants Deliverables (Stage 1 Safety Investigation)	• Findings of investigation • Recommendations for Stage 2 Safety Investigation. • Risk assessment for likely failures eg Flood, earthquake and other likely failures • Environmental issues. • Other issues eg community considerations, heritage etc.

Item	Aspects to be Considered

Project Brief (Stage 2 Safety Investigation and Concept Design)	Extent of the consultancy including the:
	• Scope of work:
	  ○ Undertake using appropriate analysis techniques/modelling the additional investigations identified in Stage 1.
	  ○ Prepare required additional information (e.g. flood maps)
	  ○ Complete the safety assessment and confirm/identify safety deficiencies (unacceptable risks)
	  ○ Prepare options for required remedial works taking into consideration construction risks and operational requirements (with cost estimates +- 30%).
	  ○ For the selected option prepare concept drawings/information on the remedial works and cost estimate (±10 to 15%)
	• Deliverables (see below)
	• Timeframe
	• Options to be considered and any constraints (ie options already abandoned.
	• Reporting procedures
	• Standard and format for presentation of outcomes including drawings and specifications
	• Procedure for reviewing consultants deliverables

Consultants Deliverables (Stage 2 Safety Investigation and Concept Design)	• Findings of accepted investigations from stage 1. • Brief and drawings of proposed options • Scope estimate of likely cost of options (~~Accuracy +/- 20 to~~ ±30%). • Advantages and disadvantages of each option where required including construction issues. • Summary of development of the concept including assumptions made for the design. • Calculations for concept including construction phase if required. • Drawings of proposed works and Briefs for any plant that is required. • Financial Approval Estimate (Accuracy +/- 10 to 15%) • Solutions for Community ,Heritage & Indigenous Issues • Potential for early warning systems

Project Brief (Detailed Design)	Extent of the consultancy including the:
	• Scope of work:
	  ○ Detailed design of remedial works ensuring constructability and including risk and safety limitations during construction.
	  ○ Prepare tender documentation (Drawings & Specification)
	  ○ Prepare/update various documents as required (e.g. O&M Manuals, Emergency Contingency Plan etc.)
	• Deliverables (see below)
	• Timeframe
	• Reporting procedures
	• Standard and format for presentation of outcomes including drawings and specifications
	• Procedure for reviewing consultants deliverables

Item	Aspects to be Considered
Consultants Deliverables (Detailed Design)	• Detailed Design Report including construction risk/limitations aspects. • Calculations for the Detail design including important assumptions • Detailed drawings, Specifications (Tender documentation) • Construction Plan (if required) • Environmental Management Plan and checklist for Construction Phase (if required). • Emergency Contingency Plan (if required) • Operating/Training Manuals (if required)
Reviewing Consultants Work	Main areas to be covered, but not limited to: • Assessing that the deliverables meet the SA Water objectives for the project and that they are fit for purpose • That the input data is correct and the latest available • Assumptions made are realistic and appropriate • Life of plant and materials are acceptable • All issues have been suitably addressed. eg Environmental, Safety etc Specific points that should be included, but not limited to: • Construction work area • Power Supply • Additional Land required • Survey control points • Vehicle Access • Continuing operation during construction. • Site Works o Drainage o Roadworks (materials, grades etc) o Fencing, security o Tree removal, Revegetation o Public signs • Main Dam/Spillway o Suitability of Materials Eg rock, clay, concrete strength and durability etc o Metal selection and coatings o Stability of proposals o Seepage through dam and foundation o Seepage collection and measurement o Concrete and other surface finishes o Rock bolting • Instrumentation o Water levels o Piezometers o Survey check points o Rainfall o Seepage o Temperature o Seismic activity o Telemetry • Occupational Health and Safety aspects, eg: ladders handrails plant guards.

Item	Aspects to be Considered
	• Telemetry, warning systems, etc • Operational requirements.