



KEY RESULT AREA (KRA) 2

Technical

Our Objective – ‘Provide technical guidelines and training that meet and advance good practice’

Guidelines

The process of preparing a guideline requires considerable voluntary effort by a number of busy professionals over an extended period.

The Guidelines on Design of Dams and Appurtenant Structures for Earthquake was published and an Addendum issued to the Guidelines on Tailings Dams. It is expected that the Guidelines on Geotechnical Investigations of Dams, their Foundations, and Appurtenant Structures will be published in the immediate future.

The updated Guidelines on Selection of Acceptable Flood Capacity and new Guideline on Design Construction, O&M of Retarding Basins are nearing completion.

Good progress is now being made on the updated Guidelines on Risk Assessment and a new team is being assembled to progress the Guidelines on Dam Safety Management. Five other new guidelines are in various stages of development.

The table below sets out the current status of all existing guidelines and those under preparation and the current convenor of each working group.

Guideline	Status	Convenor
Arch Dams	New guideline in preparation	Marius Jonker
Consequence Categories for Dams (2012)	Watching Brief	David Ryan
Dam break modelling and Consequence Assessment	Practice Note in preparation	David Stephens
Dam Instrumentation & Monitoring Systems (1983)	Under review	Chris Topham
Dam Safety Management (2003)	Updated guideline in preparation.	David Stewart
Dam Safety Emergency Plans and Emergency Management	New Guideline to be prepared.	Angus Paton
Design Criteria for Concrete Gravity Dams (2013)	Watching Brief	David Ryan
Guidelines on Design of Dams and Appurtenant Structures for Earthquake (2019)	Guideline published.	Steve O'Brien
Design, Construction, O&M of Retarding Basins	New Guideline in final stages of preparation	Richard Rodd
Geotechnical Investigations of Dams, their Foundations, and Appurtenant Structures (2019)	New Guideline in final stages of publication.	Robin Fell
Outlet Works for dams	New guideline in preparation.	Marius Jonker
Risk Assessment (2003)	Updated Guideline in preparation.	Shane McGrath
Selection of Acceptable Flood Capacity (2000)	Updated Guideline in final stages of preparation. Old version still available.	Peter Hill
Strengthening and Raising Concrete Gravity Dams (1992)	Under Review. Still available for sale.	Richard Rodd
Tailings Dams (2012)	Addendum published	David Brett
Environmental Management of Dams (2001)	Existing. Will remain for sale.	Saint Rooks
Regulation and Practice for the Environmental Management of Dams in Australia (2014)	Watching Brief to be established.	Saint Rooks

The production of all these guidelines could not be achieved without the enormous efforts of the convenors, the members of the guideline working and reference groups, and the independent reviewers. ANCOLD extends its sincere thanks to all the contributors. It is encouraging to see the keen interest expressed by the large number of people willing to participate in this key and important activity of ANCOLD.

Draft guidelines are issued for comment by the membership and by Australian and international expert reviewers before they are published. Purchase of guidelines can be made via the website or directly from the Secretariat.

Work has commenced to reinstate the Guidelines Steering Group. The aim is to improve communications and coordination between convenors so that the suite of Guidelines is as compatible as practicable.

Guideline Working Group Reports

Guidelines on Arch Dams (New Practice Note)

The Working Group is working on formalising design criteria for concrete arch dams which would be issued as supplementary Practice Notes to the Guidelines on Design Criteria for Concrete Gravity Dams (2013). The Practice Notes will be kept quite short and not repeat the relevant information already covered, such as the concrete and foundation material properties.

Over the past year the authors have made progress with the development of the first draft for peer review.

Marius Jonker

Convenor

Membership of the Working Group	Company
Marius Jonker (Convenor)	Entura
Francisco Lopez	SMEC
Dr Radin Espandar	Entura
Technical Review Panel	
Brian Cooper	Brian Cooper Consulting
International Expert Review	
Dr Yusof Ghanaat	Quest Structures (USA)

Guidelines on the Consequence Categories for Dams (Watching Brief)

INTRODUCTION

The current version of the Guidelines on the Consequence Categories for Dams was published in September 2012. The purpose of the guidelines is to provide a consistent method of categorising the consequences of dam failure so that resources can be allocated according to the potential effects of failure of the dam on the general community.

A Watching Brief Committee was appointed by the ANCOLD Executive in 2014 to monitor industry trends both nationally and abroad and assess the currency of the existing guidelines against any change in approach to consequence assessment.

ONGOING INVESTIGATIONS

A minor amendment to the Guidelines was accepted by the ANCOLD Executive in 2015 which was also detailed in the 2015 Annual Report. Since that time, there has been no further queries on the Guidelines or identified need for further amendment.

The Watching Brief committee will continue to maintain surveillance on matters associated with the guideline and invite any suggestions or comments that may assist with ensuring the guidelines reflect current industry trends.

David Ryan

Convenor

Membership of the Working Group	Company
David Ryan (Convenor)	SunWater, Queensland

Guidelines on Dambreak Modelling and Consequence Assessment (New Practice Note)

Progress has continued to be made on these guidelines over the last 12 months, with a number of new draft sections on aspects of consequence assessment added. It is hoped that a complete draft of the full document will be collated over the coming year for review and comment from the technical review panel.

David Stephens

Convenor

Membership of the Working Group	Company
David Stephens	HARC
Michel Raymond	Seqwater
Michael Smith	Watercorp
Andrew Northfield	HARC
Kevin Bartlett	DEWS
Rob Fowden	DEWS
Tim Rhodes	SMEC

Technical Review Panel

There is a reference group of 16 people representing a mix of dam owners, consultants and regulators across all states.

International Expert Review

To be determined

Dam Instrumentation & Monitoring Systems (Watching Brief)

The Watching Brief for the *Dam Instrumentation and Monitoring Systems Guidelines* (1983) was established following the Dam Instrumentation Workshop in Sydney and continues to scan for information and topical developments related to the monitoring of dams using a range of instrumentation techniques.

Whilst the 1983 guidelines were comprehensive for their time, they are also the oldest ANCOLD guidelines and celebrated their 36th anniversary this year. They still present a reasonable framework for dam instrumentation and contain useful factual information on the instrumentation of that era, much of which is still generating data at existing dams.

It is felt that the guidelines could be updated to reflect new technologies available, and developments in real time remote monitoring of dams, but no work on this has commenced, pending the outcomes of the update of the 2003 *Guidelines on Dam Safety Management*, which are closely linked. A Working Group formed in April 2017 to look at reviewing and updating Dam Safety Management Guidelines. This working group will include consideration of the linkages between the two documents, and the future of the Dam Instrumentation and Monitoring Systems Guidelines.

Any members wishing to contribute papers, views, or information to the watching brief should contact Chris Topham at chris.topham@hydro.com.au.

As it is still considered a relevant document, the 1983 version of the guideline has been reprinted and can be purchased via the online shopping cart on the Guidelines page.

Chris Topham

Convenor

Membership of the Working Group	Company
Chris Topham	Hydro Tasmania
Craig Johnson	GHD

Guidelines on Dam Safety Emergency Plans and Emergency Management

The first full draft of the guideline was completed and reviewed by the working group in October 2018. The review identified issues with the structure and contents of the draft guidelines. The structure has since been modified and the contents are partly redrafted. With a number of retirements the members of the Technical Review Panel or Reference Group needs to be reviewed.

Angus Paton

Convenor

Membership of the Working Group	Company
Angus Paton (Convenor)	Murray Darling Basin Authority
John Tibaldi	Seqwater
Saraj Perera	Department of Environment, Land, Water and Planning
Jonathon Reid	SMEC
Robert Wilson	
Reference Group	
To be reviewed	
International Expert Review	
To be decided	

Guidelines on Dam Safety Management (Updating Guideline)

Over the past year I have been working with members of the ANCOLD Executive to determine the terms of reference for the review of the Guideline on Dam Safety Management. Since its original publication in 2004, the current guideline has become the cornerstone for good practice in dam safety management in Australia and are widely used and cited internationally. Two of the main industry changes since 2004 have been an increased acceptance and use of risk-informed approaches to dam safety management activities, in particular surveillance and monitoring, and the revision of the Consequence Guidelines. There has also been revisions to and publication of several other guidelines and working groups looking at specific issues such as dambreak, flood mapping and mechanical and electrical components of dams, ICOLD's Bulletin 154 "Dam safety management: Operational phase of the dam life cycle" published in 2017 outlines a broader approach to dam safety management systems.

Our current view is that the revised Guidelines should consider all these developments and outline a framework for holistic dam safety management and provide guidance on the use of all other supporting documents and guidelines. A small workshop in Melbourne in September commenced a process to map the interrelationship between all guidelines, and identification of any potential overlaps or gaps in the documents. It is proposed that this will help to define the requirements for the revised dam safety management guidelines to be considered by the Executive. Over the last couple of years several members of the original working group have changed roles and it is intended to reform a suitable working group early in 2020 to complete the revision of the guidelines. Anyone interested in being an active part of that group is invited to contact me directly.

In addition to the work on the guidelines, we have also reviewed and provided comment to ANCOLD on ICOLD's proposed Generic Dam Safety Guidelines and the draft dam safety regulations for NSW.

David Stewart

Convenor

Guidelines on the Design Criteria for Concrete Gravity Dams (Watching Brief)

INTRODUCTION

The current Guidelines on the Design Criteria for Concrete Gravity Dams were published in September 2013. A Watching Brief Committee was appointed by the ANCOLD Executive the following year to monitor industry trends both nationally and abroad and assess the currency of the existing guidelines against any change in approach to the design criteria we have adopted.

ONGOING INVESTIGATIONS

A number of documents have been reviewed recently including FERC (2016) and Energiforsk (September 2016). Despite some variations in safety criteria, it is considered there is no need to update the guidelines nor has there been a query or request to amend the current version of the ANCOLD Guidelines.

The Watching Brief committee will continue to maintain surveillance on matters associated with the guidelines, including progress on relevant ICOLD Bulletins, and is willing to consider any suggestions or comments that may assist with ensuring the guidelines reflect current industry trends.

David Ryan

Convenor

Membership of the Working Group	Company
David Ryan (Convenor)	Stantec, Australia
Michael Somerford	Water Corporation, West Australia

Guidelines on Design of Dams and Appurtenant Structures for Earthquake (Revising Guideline)

The Draft Guideline was issued to the ANCOLD Members and to the International Reviewers for comment in late 2016. Comments were received from ANCOLD Members by 30th June 2017, the final of the International Reviewer comments were received in mid-August 2017. All comments were subsequently collated and responses developed in conjunction with the development of the Final Guideline. In all, approximately 400 comments were received from the ANCOLD Members and International Reviewers with all comments being responded to by February 2018. After developing the Final Guideline there was one outstanding item regarding the post closure criteria for Tailings Dams and ensuring consistency with the Tailings Dam Guidelines. In order to resolve this issue it was agreed with the ANCOLD Executive that independent expert advice was considered necessary. This independent advice was received in August 2018 and the matter resolved. Two rounds of technical editor's review of the Guideline were then completed and the document updated accordingly. The Guideline was published in June 2019 and is available for purchase from the ANCOLD Website. I would like to thank the members of the Working Group and the International Reviewers for all their efforts in helping produce of the revised Guideline.

Steve O'Brien

Convenor

Membership of the Working Group	Company
Steve O'Brien (Convenor)	AECOM
Ian Landon Jones	Independent Consultant
Robin Fell	Independent Consultant/UNSW
Brian Cooper	Independent Consultant
Jon Williams	GHD
Peter Allen	Dam Safety Regulator QLD, DEWS
Graeme Bell	Independent Consultant
David Ryan	Independent Consultant
Gary Gibson	ES&S
Gavan Hunter	AECOM
Andrew Reynolds	MDBA
David Brett	GHD
Paul Somerville	Risk Frontiers/AECOM
Bandula Kendaragama	SMEC
Dan Forster	Dam Safety Intelligence
Nihal Vitharana	ARUP
International Expert Review	
Dr Lelio Mejia	Geosyntec Consultants
Trevor Matuschka	Engineering Geology Ltd
Dr Martin Wieland	Independent Consultant

Guidelines on the Design Construction, Operations & Maintenance of Retarding Basins (New Guideline)

The Working Group has completed drafting of the Guideline and schematic drawing should be completed and incorporated by the end of 2019. Drafting and inclusion of Figures/Illustrations has been completed and all that remains is how to incorporate (i) the Melbourne Water Corporation Retarding Basin Risk Assessment Guidelines into the ANCOLD Retarding Basin Guideline.

It was agreed by the Executive that International Review was not required. It will be distributed to the ANCOLD Membership for comment when completed.

The Working Group is planning to have the Draft Guideline out for ANCOLD Membership comment in the New Year.

Richard Rodd

Convenor

Membership of the Working Group	Affiliation
Richard Rodd (Convenor)	Richard Rodd & Associates Pty.Ltd.
Norm Himsley	NSW DSC
Mark Arnold	Melbourne Water
Technical Review Panel	
Phil Cummins	
International Expert Review	
Not Required	

Practice Note on Geotechnical Investigations of Dams, their Foundations, and Appurtenant Structures

At the request of the ANCOLD Executive what was to be a Practice Note has been re-formatted into a Guideline.

In Practice Note format the document was reviewed by the Working Group members and Technical Peer Reviewers, and about 15 others representing dam owners, regulators, dam engineers, Engineering Geologists and Geotechnical Engineers. In addition to these reviewers, the draft was forwarded to about 15 other persons who did not respond. The document was extensively amended to take account of the comments.

After re-formatting the document has been reviewed again by Working Group members and the Technical Peer Reviewers. The comments received have been addressed.

The document is now finalised and is with ANCOLD Executive for editorial review prior to publication. It is expected it should be published before the end of 2019.

Robin Fell

Convenor

Membership of the Working Group	Company
Robin Fell, Geotechnical / Dam Engineer,	School of Civil and Environmental Engineering, UNSW
Gavan Hunter Geotechnical / Dam Engineer	AECOM
Paul Southcott, Geotechnical / Dam Engineer	Entura.
Geoff Eades, Engineering Geologist	Retired
Alan Moon, Engineering Geologist,	Consultant
Andrew Barclay, Engineering Geologist	GHD
Derek Forster, Engineering Geologist,	SunWater
Barton Maher, Principal Engineer Storage Planning	SEQWater
Neil Smith, Dam Safety Manager,	Hydro Tasmania
Richard Rodd, Dam Engineer,	Richard Rodd and Associates
Technical Review Panel	
Phillip Cummins	Consultant
Alan White	TasWater
Norman Himsley	NSW Dams Safety Committee and Consultant
International Expert Review	None required

Guidelines on Outlet Works for Dams (New Practice Notes)

A new guideline is being prepared and will be in the form of in 10 separate Practice Notes issued as a series of documents. The Working Group is progressing the Notes in the following order of priority:

- Practice Notes 1. General Functions of Outlet Works (Lead: Marius Jonker): Draft near completed
- Practice Notes 2. Configuration and Purpose of Outlet Works Components (Lead: Marius Jonker): Draft near completed
- Practice Notes 9. Rehabilitation, Modernization and Upgrade (Lead: Frank Nietzsche): Draft in progress
- Practice Notes 8. Operation and Maintenance (Lead: Brian Simmons): Draft in progress
- Practice Notes 10. Risks and Outlet Works (Lead: David Law): Draft in progress
- Practice Notes 3. Design Considerations

- Practice Notes 4. Considerations for Civil Structures
- Practice Notes 5. Considerations for Mechanical Elements
- Practice Notes 6. Considerations for Electrical Elements and Control Systems
- Practice Notes 7. Procurement, Construction, Installation and Commissioning

Marius Jonker

Convenor

Membership of the Working Group	Company
Marius Jonker	Entura (VIC)
Glen Hobbs	Glen Hobbs & Associates (NSW)
Frank Nitzsche	GHD Pty Ltd (NSW)
Brian Simmons	WaterNSW
Charlie Curro	Department of Public Works (NSW)
David Ryan	SunWater (QLD)
Rod Mauger	Australian Asset Engineering (VIC)
David Law	Entura (TAS)
Trevor Lange	Goulburn-Murray Water (VIC)
Alex Gower	Water Corporation (WA)
Additional Members	
Pieter van Breda	Project Manager
Steven Fox	Executive Committee Liaison
Technical Review Panel	
Marty Gross (Electrical)	Retired from Hydro Tas (TAS)
Brian Cooper (Civil)	Brian Cooper Consulting (NSW)
International Expert Review	
Vacant	

Guidelines on Risk Assessment (Updated/New Guideline)

Immediately prior to the 2015 Annual Conference a workshop was held to seek feedback from Members on the proposed content for the updated Guidelines on Risk Assessment.

Several submissions were subsequently received, and the Working Group met to consider them in February 2016. Progress by the working group since that time has been mixed and the completion of responses to feedback and development of the draft update has been considerably delayed.

However, I am now able to report that by the time of this year's Annual General Meeting, we anticipate that responses to feedback will have been completed and issued, and the draft Guideline well advanced. Once this process has been completed, the draft will be submitted for independent review.

Shane McGrath

Convenor

Membership of the Working Group	Company
Shane McGrath	SGM Consulting
Malcolm Barker	GHD
Emeritus Professor Robin Fell	UNSW Global Consulting
Mark Foster	AECOM
Peter Hill	HARC
Len McDonald	Retired
Reference Group	
Phillip Cummins	Siraj Perera
Graeme Bell	Michael Somerford
Peter Allen	Angus Paton
Gamini Adikari	Paul Southcott
Mark Arnold	Barton Maher
Andrew Reynolds	David Ryan
Ian Landon-Jones	Andrew Richardson
Chris Topham	Bruce Duncan
Kelly Maslin	
International Expert Review	
TBA	

Selection of Acceptable Flood Capacity (Revised Guideline)

The ANCOLD Guidelines on Selection of Acceptable Flood Capacity (AFC) was published in 2000 and provide guidance on the selection of design flood capacities for dams. A Working Group was established in early 2014 and is supported by a Reference Group representing owners, consultants and regulators from around Australia.

To date the revision has involved:

- Working Group prepared a discussion paper on the proposed scope of the revision
- Workshop held with Reference Group in October 2014 to review the discussion paper
- Workshop held at the November 2015 ANCOLD Conference to outline the principles of the revision and test the proposed changes.
- Working Group then incorporated the feedback from the workshop and prepared a full draft of the new guideline
- Full draft guidelines was reviewed by the Reference Group in mid-2016 and feedback incorporated
- An overview of the guideline was presented at the 2016 ANCOLD Conference Workshop
- The draft guideline was reviewed by the 2 Australian peer reviewers in early-2017 and feedback incorporated
- The updated draft was then reviewed by Reference Group
- Addressed final comments by Reference Group

Work on the guideline stalled in 2018/19, however the guideline is nearing completion and the final stages are:

- International Peer Review
- Seek comment from broader ANCOLD community
- ANCOLD Executive endorsement of document and process
- Finalise and publish

It is anticipated that the final draft will be made available for comment in late 2019.

Peter Hill

Convenor

Membership of the Working Group	Company
Peter Hill	HARC
Fiona Ling	WMAwater
Michel Raymond	Seqwater
Andrew Reynolds	MDBA
Michael Somerford	Water Corporation WA
Reference Group	
Peter Allen	Qld DNRME
Mark Arnold	Melbourne Water
Malcolm Barker	GHD
Peter Cloke	NSW Urban Water Services
Janice Green	Bureau of Meteorology
Norm Himsley	NSW Dams Safety Committee
Barton Maher	Seqwater
Joe Matthews	Southern Rural Water
Shane McGrath	SGM Consulting
Nanda Nandakumar	WaterNSW
Angus Paton	MDBA
Siraj Perera	DELWP (Vic)
Michael Thornton	Snowy Hydro Limited
Independent Reviewers	
Rory Nathan	Melbourne University
Phil Cummins	ADWC

Guidelines on Tailings Dams (Watching Brief)

The Working Group is active and has been involved with review of inconsistencies between the Tailings Dam Guideline and the new ANCOLD Guidelines for Design of Dams and Appurtenant Structures for Earthquake. This has resulted in the issue of Addendum 1 to the Guidelines on Tailings Dams, removing the inconsistencies and also adding guidance on several issues that have arisen over recent years including governance matters and discussion of how to deal with static liquefaction.

The Working Group is currently planning a workshop for Perth in November 2019 to cover "Engineering for Liquefiable Tailings". Also the Working Group is following current developments on "international standards" for tailings dams being driven by ICMM, international investors and the UNEP and assisting ICOLD in the development of a global Tailings Dam Safety Bulletin.

David Brett

Convenor

Membership of the Working Group	Company
David Brett	Senior Technical Director, Water and Waste Management - GHD Pty Ltd
Imran Gillani	Principal Adviser, Tailings, Technology and Innovation - Rio Tinto
Keith Seddon	Principal Engineer - ATC Williams Pty Ltd
Norm Himsley	Consultant and Member - NSW Dam Safety Committee
Dr Bruce Brown	Chief Adviser, Tailings and Dams, Technology and Innovation - Rio Tinto
Professor Andy Fourie	Professor of Civil Engineering - The University of Western Australia
Professor David Williams	Professor of Geomechanics - The University of Queensland
Jiri Herza	Technical Director - GHD Pty Ltd, Australia
Faye Akbar	Principal Advisor – Tailings & Dams, Growth & Innovation, Rio Tinto
David Reid	Research Fellow, University of Western Australia
Justin Willis	Superintendent Dams, Responsible Dam Engineer TRS Olympic Dam, BHP
Jay Ranasooriya	Senior Geotechnical Engineer, Mines Safety Directorate, WA
Reviewers	
John Phillips	Principal Engineer - GHD Pty Ltd, Australia
Rob Williamson	Technical Consultant - Knight Piesold, South Africa
Annika Bjelkevik	Director – Tailings Consultants Scandinavia AB, Sweden
Harvey McLeod	Vice President - Klohn, Crippen Berger, Canada

Regulation and Practice for the Environmental Management of Dams in Australia (Watching Brief)

There was no update on this guideline in 2018/19.

Saint Rooks

Convenor