

# dam safety guidelines

## Part 5: Dam safety audits

### Introduction

This part of the guideline is intended as a guide to assess when it is appropriate to audit the safety of a dam and the degree of sophistication desirable.

There are several levels of sophistication for auditing dam safety, and different audits are done depending on the stage of development of the dam.

The extent, frequency and sophistication of audits is a function of the hazard category of the dam and its importance to its owner. A method of determining a dam's hazard category is provided in Part 1 of these guidelines.

### 1.0 Why do a dam safety audit?

Dam safety audits can be done for a range of reasons which can vary during the various stages of a dam's life and depend on who is requesting the review.

The main reasons for doing a dam safety audit are summarised below:

#### 1 Public or dam safety

The most common reason for doing a dam safety audit is to ensure the dam is designed, constructed and operated in a safe manner in order to protect public safety or for insurance reasons with the same aim.

#### 2 Dam performance

Dam audits may be undertaken by the owner to assess that the scheme is what was paid for or that it is operating effectively and safely. For larger structures, owners will typically commission reviews as part of their asset management procedures and for insurance purposes.

#### 3 Asset sale

If a dam or scheme is to be sold or revalued for insurance purposes, a due diligence audit or similar will typically be undertaken. This is to assure the prospective owner or insurer of the value of the dam.

#### 4 Consent compliance

A review of consent compliance may be undertaken. This might be at the request of the regulatory authority as a cross-check on compliance or by an owner wanting to apply for modifications to the consents. For larger structures, a formal ongoing compliance schedule with regular review points is likely to be required.

## 2.0 What sort of audit is best?

There is a wide variety of audits depending on who is getting them done and why. In most cases there is considerable overlap between the different types. The main types of audits are detailed below:

### 2.1 Safety Audits

Reviews that can be considered 'Safety Audits' range from quite small to extensive and meticulous.

The most common type of larger safety audit undertaken in New Zealand is the SEED review (Safety Evaluation of Existing Dam) which are undertaken on a 5 - 6 yearly basis. For SEED reviews all the components of the scheme are examined and assigned a SEED rating based on their assessed level of safety. SEED reviews are almost always undertaken by independent reviewers and typically different reviewers will be used each time a SEED review is undertaken.

Annual safety audits are also commonly undertaken for dams, particularly those with higher hazard categories. These may be conducted internally in the case of smaller structures or by external reviewers for larger structures.

### 2.2 Due diligence audits

Due diligence audits are undertaken to determine whether the scheme has and is being run proficiently. These reviews are typically undertaken for the purpose of selling the dam or for insurance purposes. While diligence audits are not typically undertaken at the request of a regulatory authority, they do provide good background information as to the overall safety,

# dam safety guidelines

Guidelines for construction, maintenance and monitoring

level of maintenance and potential problems with the dam or scheme.

## 3.0 How do monitoring, review and audit relate to each other?

Monitoring and surveillance of dams was discussed in Part 4 of this guideline, and Figure 4.4, Part 4 indicated the generally desirable timing and frequency of the different types of monitoring and surveillance.

Figure 5.1 below illustrates how monitoring and surveillance, reviews and audits relate to the different phases of a dam's life and different information needs.

Figure 5.1: Typical Dam Review and Audit Flow Chart

Auckland Regional Council  
Dam Hazard Identification  
Dam Hazard Flow Chart

### Typical Dam Review and Audit: Flow Chart

Hazard Category	NZSOLD	Low	Significant	High
		ARC	Minimal (Permitted)	Low

#### Investigation, Design, Construction & Commissioning

Review Type	Activities	Low	Significant	High
Internal Review	General Quality Assurance Procedures	[Bar]		
	Independent Specialist: Reviewing for Owner	[Bar]		
	Specialist Review Panel throughout project.	[Bar]		
External Review	Review of Design Concept: ARC Personnel.	[Bar]		
	Review of Design Concept: Independent Specialist	[Bar]		
	Specialist Review Panel throughout project.	[Bar]		

#### Operation / Existing Dams

Review Type	Activities	Low	Significant	High
Safety Audits	General Quality Assurance Procedures	[Bar]		
	Annual Safety Review	[Bar]		
	5 Yearly Safety Review	[Bar]		
	Independent SEED Review	[Bar]		

Performance Reviews

Case by Case Basis

Due Diligence Audits

Case by Case Basis