NEW ZEALAND
Society on Large Dams

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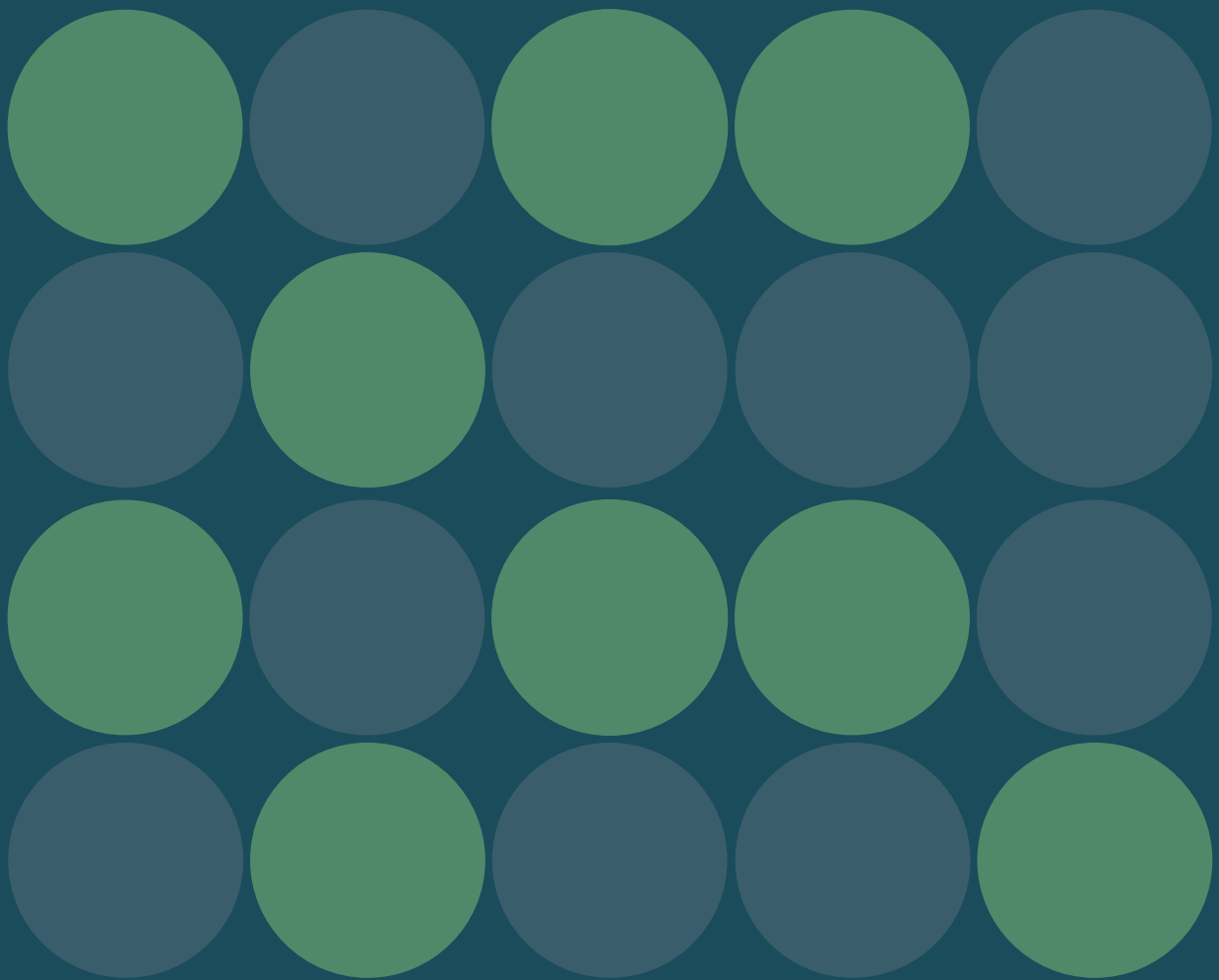
New Zealand Dam Safety Guidelines 2024

MODULE 1
LEGAL REQUIREMENTS



Abstract

Dam safety objectives and principles that are applicable to the investigation, design, construction, commissioning, operation, assessment, rehabilitation, and decommissioning of dams in New Zealand are included in the Parent Document. The Parent Document also includes a glossary of terms used in these Guidelines.

This module of the New Zealand Dam Safety Guidelines (the Guidelines) outlines New Zealand's legislative framework in 2024 for the development and operation of dams. It has been prepared to assist Owners, Designers, and Contractors in meeting the requirements of the legislation. The module:

- Outlines some of the legal obligations and liabilities of those associated with the development, ownership, and operation of dams.
- Outlines key legislative requirements for the development and operation of dams.
- Provides comments on the interpretation of legislative requirements for the development and operation of dams.

Notice to reader

Although this module is configured to be as self-contained as practicable from a technical standpoint, readers should familiarise themselves with the principles, objectives, and limitations outlined in the Parent Document before considering the information in this or any other module.

Document history

Release	Date	Released with
Original	May 2015	Parent and all modules
2023	December 2023	Updates to Parent and Modules 1, 2 and 5
2024	December 2024	Updates to Parent and all Modules

Contents

1. Introduction

1.1 Objective

New Zealand's legislative framework places a number of legal obligations on those associated with the development and operation of dams.

The objective of this module is to provide Owners, Designers, and Contractors with an appreciation of their legal obligations and to assist them in meeting the requirements of the legislation.

Note: This module does not cover all legal obligations and legislative requirements. To ensure compliance, Owners, Designers, and Contractors should consult the relevant legislation and seek professional legal advice if necessary.

1.2 Scope of module

This module focuses on providing an outline of the key legislation and parts of that legislation relevant to the development and operation of dams. This module has a strong focus on the requirements of the Building Act 2004 (Act, 2004) and Building (Dam Safety) Regulations 2022 (Regulations, 2022). It also includes an outline of legal obligations and liabilities associated with the following additional legislation:

- The Resource Management Act 1991 (RMA).
- The Building Regulations 1992 (Building Code).
- The Civil Defence Emergency Management Act 2002.
- The Health and Safety at Work Act 2015.
- The Hazardous Substances and New Organisms Act 1996.
- The Electricity Act 1992.
- The Water Services Act 2021.

Several terms defined in the Act (2004) and the Regulations (2022) are referenced throughout this module. Due to their importance, these terms are also listed in the Legislative Definitions at the end of the module.

2. Legal obligations and liabilities

The following subsections provide an outline of legal obligations and liabilities under common law, the RMA 1991, the Act (2004), the Civil Defence Emergency Management Act 2002, the Health and Safety at Work Act 2015, and the Hazardous Substances and New Organisms Act 1996.

2.1 Liability under Common Law

Liability for the escape of water is most often dealt with via legislation. However, it can also be managed under the general tort of nuisance or the more specific (and easier to establish) legal principle of strict liability as established in the case of Rylands v Fletcher (1868).

Liability at common law through the tort of nuisance requires a party to prove that the damage caused by the escape of water was due to the failure of the Owner/Operator to meet a required standard of care.

Liability for damage caused by the escape of water can also arise for certain substances (e.g. water behind dams), where the activity is inherently dangerous if a breach occurs. In such cases, liability can be imposed for policy reasons even in the absence of negligence on the part of the Owner or Operator. This means that the Owner and/or Operator can be held strictly liable, provided the resulting damage is foreseeable.

The lead case on strict liability is Ryland v Fletcher which dealt with water escaping from a reservoir into another property. Here, the House of Lords established the following principle of law:

> **... we think that the true rule of law is that the person who for his own purposes brings on his lands and collects and keeps there anything likely to do mischief, must keep it in at his peril, and if he does not do so, is prima facie answerable for all damage which is a natural consequence of its escape.**

This provides a clear basis for strict liability of the dam Owner. The water (or other stored material) is kept at the peril of the person responsible for keeping it there, and that person will be liable if the stored material escapes. Fault is not a necessary element for liability to be established. The risk is implicitly accepted by bringing a known dangerous substance onto the land.

In practice, Operators and Owners of dams must be aware of the basic principle that operating a potentially dangerous structure such, as a dam, involves exercising reasonable care to avoid reasonably foreseeable risks of loss from any failure. The focus is on whether actions taken during the design, construction, and operation of the dam were reasonable under the circumstances to prevent such failures.

The Owner or Operator of a dam could be civilly liable for damage caused by processes which arise as a natural consequence of the existence of the dam. If the damage was the reasonably foreseeable result of the activity of damming the river, etc., then the Owner/Operator could be liable. In such cases, an 'act of God' may be inadmissible as a defence.

The Ryland v Fletcher principle is limited by the requirement that the kind of harm or damage suffered must be foreseeable. This aims to limit liability under this rule; however, one may still be held liable even if all reasonable care was exercised to prevent the escape of stored contents. That is, one should assume that despite conforming or even exceeding the highest standards it is probable that the Owner will be held responsible for any damage resulting from the failure of a dam.

2.2 Resource Management Act 1991 (RMA)

The purpose of the RMA is to promote the sustainable management of natural and physical resources. This includes avoiding, remedying, or mitigating any adverse effects of activities on the environment.

It is not uncommon for resource consents relating to dams to have dam safety related consent conditions. The nature of these consent conditions has varied over time and across regulators. Some conditions are explicit in specifying how the dam is to be maintained and operated, while others are more general and may refer to specific aspects of these Guidelines such as Dam Safety Reviews. Where resource consent conditions specify how the dam and reservoir are to be operated, it is important that these conditions facilitate the safe operation and maintenance of the dam. This may include provisions for operational sluicing, increased discharge during spillway gate testing, or lowering reservoir levels for remedial or maintenance works.

The RMA provides for criminal proceedings for offences committed under its provisions. Accordingly, it is imperative to operate lawfully with all relevant consent conditions for the maintenance and operation of the dam, and otherwise in accordance with any conditions of the resource consent issued pursuant to section 108 of the RMA and any National Environmental Standard, regional plan or district plan.

Section 341(1) establishes that the criminal provisions of the RMA are strict liability offences. This means that it is not necessary to prove the defendant intended to commit the offence in order for a contravention of the RMA to occur. For example, in the case of the Opuha Dam failure in 1997, the Court ruled that neither foreseeability nor awareness were relevant in the context of offences of strict liability. Similarly, it was not necessary for the prosecution to show how or why the event occurred; it was sufficient to show that the event happened.

The defences are very narrow and limited. Section 341(2) of the Act sets out the specific nature of statutory defences, which must be notified within 7 days after the service of the summons. In some limited circumstances sections 18 and 330 relating to emergency works and powers to take preventive or remedial action may be applicable.

When considering natural disasters, the courts will assess that the threshold for deeming a natural occurrence unforeseeable or impossible to provide against is extremely high.

2.2.1 Penalties

Pursuant to section 339 the maximum penalty for every person who commits an offence is 2 years imprisonment (or $300,000) for a person and, in the case of a company, $600,000. There are also provisions to capture any continuous or ongoing offending.

Additional penalties may also be applicable. For example, the court may impose an amount not exceeding 3 times the value of any commercial gain resulting from the commission of the offence if the court is satisfied that the offence was committed in the course of producing commercial gain.

2.2.2 Personal liability of Directors

Directors of companies that own or operate dams cannot shield themselves behind the body corporate if the Company is charged with an offence under the RMA which was authorised, permitted, or consented to by that Director. Specifically, every individual involved (e.g. the Company, Directors, Agents, Contractors) may be charged. However, the liability of principals for the acts of their agents may have additional defences pursuant to section 340 of the RMA.

The Company and its Directors are responsible for ensuring that dam safety procedures are designed, established, and followed to prevent incidents which could give rise to a criminal prosecution under the RMA. Depending on the circumstances, senior managers, agents, and contractors may also all share the responsibility.

2.2.3 Remedies by litigants

Litigants who identify potential damage with no precautions in place may consider options ranging from 'Quia timet' injunctions, which are brought to prevent the possibility of future damage or injury, to enforcement orders under the RMA.

2.2.4 RMA reform

The previous version of these Guidelines noted the introduction of the Natural and Built Environment Act 2023 (NBA) and the Spatial Planning Act 2023 (SPA) as part of the previous Government's reform of the RMA. The subsequent Government has repealed both the NBA and SPA in 2024, as well as introducing additional proposed legislation. At the time of writing these Guidelines, none of the proposed new legislation has been passed into law.

2.3 Building Act 2004 (Act, 2004)

The Act (2004) is the overarching piece of legislation that sets the rules for the construction, alteration, maintenance, and demolition of new and existing buildings in New Zealand. The Act (2004) is relevant to dams in two ways; firstly, dams meet the definition of a building under the Act (2004), and secondly, the Act (2004) sets out requirements for post construction dam safety which are enacted via the Building (Dam Safety) Regulations (2022).

Referenced within the Act (2004) are several regulations that provide detail for particular building controls. These regulations work in conjunction with the Act (2004) to govern building work. Together, the Act (2004) and its secondary legislation is often referred to as the building regulatory system.

The key regulation that governs minimum performance standards of buildings within New Zealand is the Building Regulations 1992 First Schedule, also commonly known as the Building Code. The Building Code is considered a performance-based legislation that sets high level objectives that buildings must achieve. Compliance can be demonstrated in a number of ways, with the most common being Acceptable Solutions, Verification Methods and Alternative Solutions.

The Act (2004) also covers requirements for Project Information Memorandum, Building Consents, Code Compliance, exempt building works, Building Practitioners, emergency management, safety of dams, accreditation of Building Consent Authorities (BCAs), Building Products, and Offences when provisions of the Act are breached.

Building Consent Authorities are responsible for the day-to-day administration of consenting under the Act (2004) concerning dams. This includes handling all building consents, code compliance, and enforcement. The Ministry of Innovation and Employment (MBIE) oversees the Act (2004) and is the overarching regulator.

Part 5, subpart 1 of the Act (2004) covers offences and criminal proceedings that maybe initiated. These sections include definitions of various liability provisions under section 386 and 387 of the Act (2004). Dam Owners are liable for offences under the Act (2004) committed by persons while acting as agents (e.g. a consultant or contractor) for the dam Owner unless the defendant proves:

From section 386, subpart 4 of the Act (2004):

(a) In the case of a natural person (including a partner in the firm), that –

(i) he or she did not know nor could reasonably be expected to have known that the offence was to be or was being committed; or

(ii) he or she took all reasonable steps to prevent the commission of the offence; or

(b) In the case of a body corporate, that –

(i) neither the directors nor any person involved in the management of the body corporate knew or could reasonably be expected to have known that the offence was to be or was being committed; or

(ii) the body corporate took all reasonable steps to prevent the commission of the offence; and

(c) in all cases, that the defendant took all reasonable steps to remedy any effects of the act or omission giving rise to the offence.

Section 386 of the Act (2004) also states that if a body corporate is convicted of an offence against the Act (2004), every director and every person concerned in the management of the body corporate is convicted of an offence against the Act (2004), and every director and every person concerned in the management of the body corporate is guilty of the same offence if it is proved:

(a) that the act that constituted the offence took place with that person's authority, permission, or consent; and

(b) that he or she knew or could reasonably be expected to have known that the offence was to be or was being committed and failed to take all reasonable steps to prevent or stop it.

Section 379 of the Act (2004) provides for the situation where an offence under more than one enactment may arise. It ensures that no one is liable to be punished under both the Act (2004) and another Act in respect of the same act. That is, the informant must elect under which act to proceed and this section precludes an informant from proceeding against defendants, for example, under both the RMA and Act (2004).

2.4 Civil Defence Emergency Management Act 2002

The Civil Defence Emergency Management Act 2002 requires that a risk management approach be taken when dealing with hazards. It sets out the organisational structure under which national and local agencies manage emergencies and requires every regional authority and territorial authority within that region to establish a local Civil Defence Emergency Management Group (CDEMG).

If the authorities charged with Civil Defence Emergency Management responsibilities determine that an emergency exists (e.g. during a dam safety incident or dam safety emergency) then they can declare an emergency. A state of emergency can be declared at a local level for either the whole area of a CDEMG or a district within the area of a CDEMG, or at a national level. The Police can also initiate the process if other parties do not take action. Note that Territorial Authorities and CDEMGs need not declare an emergency in order to respond and may activate before an emergency is declared.

In a civil defence emergency, a key point relevant to a dam is that the powers of CDEMGs include "to carry out or require to be carried out…works…or removing or disposing of, or securing or otherwise making safe, dangerous structures and materials". There is no upper limit to the powers to "carry out works".

Depending on the function of the dam and its Owners, the Owners may also be classified as lifeline utilities. In such cases, they have specific duties as outlined in section 60 of the Civil Defence Emergency Management Act 2002.

2.5 Health and Safety at Work Act 2015 (HSWA)

The Health and Safety at Work Act 2015 (HSWA) is New Zealand's primary workplace health and safety law. HSWA was established, alongside Worksafe, in 2016 following significant reforms to workplace health and safety. WorkSafe is the primary health and safety regulator. The purpose of the HSWA is "…to provide for a balanced framework to secure the health and safety of workers and workplaces…" (HSWA, 2015).

HSWA defines and prescribes duties for four duty holders:

- Persons conducting a business or undertaking (PCBU).
- Workers.
- Officers.
- Other person at a workplace (e.g. visitors).

Whilst the HSWA does not relate directly to dam safety, the Owner of a dam is required to ensure that the dam as a workplace is safe for operational employees, as well as for other persons, including members of the public, who enter the site where the dam is located. This includes investigation work, construction work and all operations, maintenance and surveillance work.

People who own and operate dams have responsibilities under the HSWA, whether they are PCBUs, Officers, or Workers. The following is extracted from Worksafe (2019):

- **A PCBU must ensure, so far as is reasonably practicable, the health and safety of workers, and that other persons are not put at risk by its work. This is called the 'primary duty of care'.**
- **Officers must exercise due diligence to ensure the PCBU meets its health and safety obligations.**
- **Workers have their own health and safety duty to take reasonable care to keep themselves and others healthy and safe when carrying out work.**

Health and safety also needs to be considered when designing works associated with dams. Safety in Design is an established practice that should be used. It can be defined as the integration of hazard identification and risk assessment early in the design process to eliminate or minimise the risks of injury throughout the life of the product or asset being designed, as far as is reasonably practical.

2.6 Hazardous Substances and New Organisms Act 1996 (HSNO)

The purpose of the Hazardous Substances and New Organisms Act 1996 (HSNO) is to "...protect the environment, and the health and safety or people and communities, by preventing or managing the adverse effects of hazardous substances and new organisms." (HSNO, 1996).

Certain dams can contain hazardous substances (e.g. tailings or wastewater treatment dams) and the provisions of HSNO may apply depending on the substances within the tailings or reservoir.

HSNO sections 115 and 116 define liability provisions. HSNO section 115 states that employers, employees, principals and persons acting as agents for principals are liable for offences under HSNO unless the defendant proves:

(a) that –

(i) he or she did not know nor could reasonably be expected to have known that the offence was to be or was being committed; or

(ii) (he or she took such steps as were reasonable practicable to prevent the commission of the offence; and

(b) that he or she took such steps as were reasonable in all the circumstances to remedy any effects of the act or omission giving rise to the offence".

HSNO section 116 also states that if a body corporate is convicted of an offence against the Act, every director and every person concerned in the management of the body corporate shall be guilty of the same offence if it is proved:

(a) that the act that constituted the offence took place with his or her authority, permission, or consent; and

(b) that he or she knew or could reasonably be expected to have known that the offence was to be or was being committed and failed to take all reasonable steps to prevent or stop it.

3. Legislative requirements for dam development and operation

3.1 Introduction

The typical sequence for the development of a new dam is outlined in Figure 3.1. This sequence illustrates where legislative requirements related to dam safety are applied. The same sequence could also apply to upgrading an existing dam or completing rehabilitation works to correct identified dam safety deficiencies.

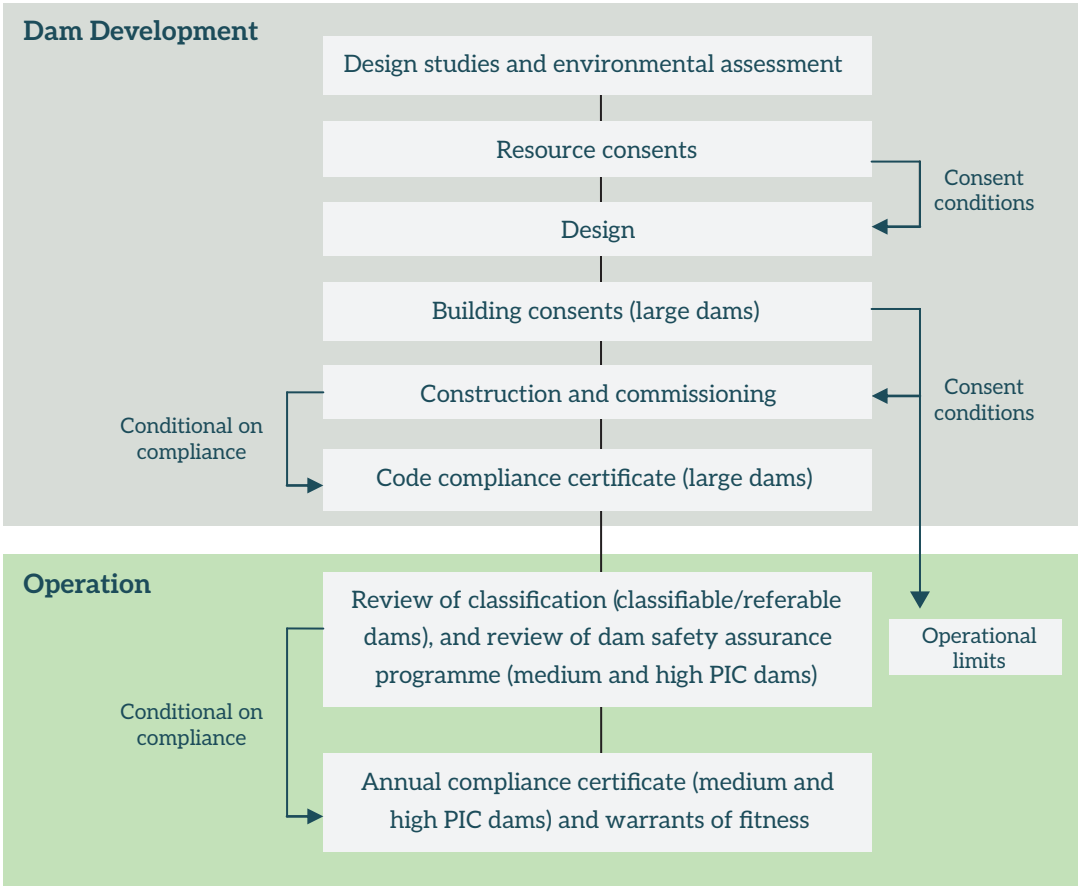


Figure 3.1: Legislative Requirements for Dam Development and Operation

From a legislative perspective, a dam is classified as a building under sections 8 and 9 of the Building Act 2004 (Act 2004). The Act (2004) sets out requirements for dam construction and dam safety. Secondary legislation within the Act (2004) includes the Building Regulations 1992 (Building Code), which requires all buildings to achieve specific performance criteria depending on the classified use or uses of the building. Additionally, the Building (Dam Safety) Regulations 2022 (Regulations 2022) set requirements for post-construction dam safety. In addition to the Act (2004), the RMA governs land and water use.

The following sub-sections provide an outline of the legislative requirements of the RMA, the Act (2004), the Regulations (2022), the Building Code, and other relevant legislation.

3.2 Resource Management Act 1991

The RMA enables conditions to be set on the design of building structures, including dams. Water permits (e.g. to divert, take, use, discharge) and land use consents (e.g. for siting, altering, using materials) for dams are obtained through the RMA. These Guidelines do not outline all issues addressed in the RMA but highlight those aspects relevant to dam safety. A key step in the application process for such permits and land use consents is establishing actual or potential effects and avoiding, remedying or mitigating them to the satisfaction of the consenting authority.

Effects include:

- Any potential effect of high probability, or
- Any potential effect of low probability but high potential impact.

Clearly the uncontrolled release of contents from dams could have a high potential impact. The RMA requires that any potential effect of significance and high probability has to be avoided, remedied or mitigated.

The RMA lists matters to be considered during the consenting process including the risks and effects of natural hazards, the use of hazardous substances and installations and, where any discharge of contaminants may occur, the nature of the discharge and the sensitivity of the receiving environment to adverse effects.

The RMA requires an assessment of risk to the environment. The following points are made:

- The terms 'hazard' and 'risk' are not defined in the RMA, but are generally understood to have the following meanings:
  - 'hazard' is related to the potential for damage, and
  - 'risk' is related to the probability and consequence of that potential being realised.
- 'Hazardous substances' are not defined in the RMA but are covered by the HSNO. Stored natural water would not normally be considered a hazardous substance under the RMA, but stored fluids having an intrinsic property of "a capacity to oxidize, corrosiveness, toxicity or ecotoxicity" are hazardous substances under the RMA. Any consent application for a dam that was to store a hazardous substance would likely be dealt with under the RMA process, but the process would need to include consideration of the requirements of the HSNO.
- 'Natural hazard' is defined in section 2 of the RMA as "any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment."

It is an offence under the RMA to allow the release of a contaminant, or water into natural water, without resource consent or unless authorised under a regional plan or district plan. It is vital therefore that consents clearly prescribe the conditions under which any uncontrolled release of contents from the dam is permitted. This is highly relevant to consents for flood management during dam construction and the in service capacities of spillways.

Dam safety planning for new projects starts with the assessment of potential effects, their likelihoods of occurrence and how to design for them to a standard society will accept via the RMA process. It is important to recognise the hazards and risks which apply during construction of the dam and during the long term in-service condition.

In the RMA consent process the applicant needs to demonstrate that the design, construction and operation practices for the dam will address hazards that have the potential to impact on the environment. Hazards may be natural hazards such as earthquakes or floods, construction hazards such as poor materials, or operational hazards such as sudden changes in river flow. Typical design, construction and operation issues that need to be addressed in consent application documents include:

- The site topography and how the dam will fit into or modify the topography.
- The regional and local geology which greatly influences structural safety, water retention and reservoir slope integrity.
- The proposed construction materials and dam arrangements to ensure safety during construction and operation.
- The flood risks at the dam and how floods are managed and passed through the structure during construction and operation.
- The seismic hazard and earthquake loads which the dam, with its stored contents, and the reservoir shoreline may experience.
- The surveillance, maintenance, and operational procedures to ensure safe operation of the dam.
- Strategies for the management of other risks such as wind, slope stability upstream of the reservoir, and human error in design, construction, and operation of the project.
- The downstream effects of a potential dam failure and strategies for emergency management should the integrity of the dam be in doubt.

For new dams, detailed design may not be complete at the resource consent stage. Accordingly, the information presented for RMA consents must demonstrate that the hazards are manageable and appropriate.

Safety issues associated with dams, particularly large dams, can be complex. Therefore, these Guidelines recommend that for new large dams, whose failure would result in significant downstream effects, any consent hearing committee or commissioner should be assisted by a senior dam engineering specialist with appropriate experience in dam design and construction.

3.3 Building Act 2004

The Building Act 2004 (Act, 2004) contains extensive provisions for dam construction and dam safety. The provisions within the Act (2004) for dam safety require the Building (Dam Safety) Regulations 2022 (Regulations 2022) to be read in conjunction with the provisions. These Regulations came into force 13 May 2024.

The Act (2004) considers dams to meet the definition of a building under section 8 and 9 of the Act (2004) and therefore requires its provisions to be met. Dams that do not meet the large dam criteria defined in the Act (2004) are exempt from some building consent requirements (refer to Schedule 1 of the Act, 2004). However, these dams must still meet the requirements of the Building Code and can be subject to sections 157, 158 and 159 of the Act (2004) if the dam becomes an immediate danger and action needs to be taken. Requirement for resource consent is also likely and must be sort prior to construction.

3.3.1 Requirements for development and alteration of large dams

The Act (2004) includes the following requirements for the development of all new large dams or any alterations or additions of existing large dams:

- An application for building consent from the Owner to the Building Consent Authority (BCA), for any building work (including alterations, demolition or removal). This application must be made on the prescribed form (Form 2) and be accompanied by sufficiently detailed plans, specifications, design reports and design reviews. These documents should demonstrate how compliance with the Act (2004) and the Building Code will be made. A Form 5 building consent will be provided along with the approved documents once compliance with the Building Code has been proven. This form will include information such as inspections required to be undertaken by the BCA during construction, construction monitoring expected to be completed, documents that will be required for the BCA to be satisfied on reasonable grounds that compliance with the building

consent has been met, and whether or not a compliance schedule is required. Attachments can also be included such as notice for development contributions (section 36), notice that resource consent is required (section 37), and section 75 certificate that allows the grant of consent so long as the allotments within the building consent are not transferred or leased except in conjunction with the specified allotments.

- A Project Information Memorandum (PIM) should be sought by the Owner from local and regional authorities prior to applying to the BCA for building consent. The PIM will outline any planning and land issues that the authorities are aware of for the proposed construction area. This can identify early design issues such as requirement for resource consent, development contributions, natural hazards, heritage buildings or sites, and any existing utilities on site.
- An application for code compliance certificate from the Owner to the BCA as soon as practicable after completion of the works covered under the building consent. This application must also be made on the prescribed form (Form 6) and be accompanied by any energy work certification undertaken under the building consent. The BCA will also require any requested inspections and documentation within the form 5 to be provided. This enables the BCA to make the decisions as required under section 94 of the Act (2004) on whether the works comply with the building consent that was issued. Once the requirements of section 92 and section 94 of the Act (2004) are met, the code compliance certificate can be issued.

As per section 42A of the Act (2004), a building consent is not required for building work when it meets the criteria described within either Part 1, Part 2, or Part 3 of Schedule 1 of the Act (2004). However, such works must still comply with the Building Code. After completion, the building must continue to comply with the Building Code or maintain the same level of compliance as before the works. Additionally, it must not breach any other enactment and must not be a hazardous substance location requiring authorisation under HSWA.

Under section 42 of the Act, a Certificate of Acceptance (CoA) must be applied for if building work that required a building consent has been completed without one in urgency. This application must be done as soon as practicable after completion of the building work and must be made to the relevant Authority on the prescribed form (Form 8). It should be noted that a CoA will only be issued if the authority is satisfied to the best of its knowledge and belief and on reasonable grounds that the building works complies with the Building Code.

3.3.2 Producer Statements

Producer statements were first introduced with the Building Act 1992. The current Act (2004) and the Building Amendment Act 2013 do not mention producer statements by name, but nevertheless they continue to be used by some regional authorities as a means of demonstrating compliance with the requirements of the Building Code, the recommendations included in the Guidelines, and demonstrating that the dam has been constructed in accordance with the requirements of the building consent and its amendments.

Producer statement templates and guidance on the use of producer statements can be downloaded from the Engineering New Zealand and ACE New Zealand websites. The templates include:

- **Producer Statement PS1 Design**, which is intended for use by a suitably qualified design professional, where the regional authority requires a statement of opinion that the proposed building works will comply with the requirements of the Building Code and the recommendations included in the Guidelines.
- **Producer Statement PS2 Design Review**, which is intended for use by a suitably qualified design professional who completes a review of the design documentation, where the regional authority requires an independent statement of opinion that the proposed building works will comply with the requirements of the Building Code and the recommendations included in the Guidelines.
- **Producer Statement PS4 Construction Review**, which is intended for use by a suitably qualified design professional who undertakes construction monitoring of the building works, where the regional authority requires a statement of opinion that the building works have been completed in accordance with the building consent and its amendments.

Engineering New Zealand and ACE New Zealand used to provide a PS3 Construction template; however, this is no longer the case. Instead, Schedule 6 of the NZS3910:2013, 'Form of Producer Statement – Construction', is used to certify that the building works have been completed in accordance with a contract. Schedule 6 is usually completed by the Contractor.

3.3.3 Requirements for dam safety

The Act (2004) also includes minimum regulatory dam safety requirements. These requirements are set out in sections 133A to 162 (inclusive), and include:

- The notification of the size and location of classifiable or referable[1] dams to regional authorities by dam Owners.
- The establishment and maintenance of registers of classifiable or referable dams in their regions, by regional authorities.
- The classification of classifiable dams, and the classification of referable dams which are located within a designated area and are required by regional authorities to be classified, to reflect the potential impact of dam failure on people, property and the environment.
- The classifications must be completed by Owners utilising the criteria and form included in the Regulations (2022) (refer section 3.4 of this module), certified by Recognised Engineers with the competencies included in the Regulations (2022), and submitted to the relevant regional authority for approval.
- Owners must also review their dam classifications at intervals of not more than 5 years, or whenever modifications to dams could result in changes to the downstream effects that would likely follow dam failure. Reviewed classifications must be certified by Recognised Engineers with the competencies included in the Regulations (2022) and submitted to the relevant regional authority for approval.
- The preparation and maintenance of dam safety assurance programmes for all dams with Medium or High Potential Impact Classifications (PICs). While dam safety assurance programmes for dams with Low PICs are not required by the Act (2004), it is in the interests of the Dam Owner and the Public that good dam safety assurance practice is applied to all classifiable dams, not just those with Medium or High PICs. Some dam Owners may choose to develop dam safety assurance programmes for Low PIC dams to support their asset management objectives. The requirements of such programmes and plans would typically be less onerous than those for Medium or High PIC dams and would normally incorporate less detail and reduced inspection frequencies.
- The dam safety assurance programmes must be developed by Owners utilising the criteria and form included in the Regulations (2022) (refer section 3.4 of this module), be certified by a Recognised Engineer with the competencies included in the Regulations (2022), and be submitted to the relevant regional authority for approval. A regional authority may refuse to approve a dam safety assurance programme only if the regional authority is satisfied that the engineer who provided the certificate referred to in section 142(1) (b) of the Act (2004) is not a Recognised Engineer.
- Owners must review their dam safety assurance programmes within 5 years (if a High PIC dam) or 10 years (if a Medium PIC dam) of the regional authority originally approving the dam safety assurance programme, and every 5 years (if a High PIC dam) and 7 years (if a Medium PIC dam) thereafter.
- Owners must also review their dam safety assurance programmes whenever modifications to dams could result in changes to the downstream effects that would likely follow dam failure.
- Reviewed dam safety assurance programmes must be certified by a Recognised Engineer with the competencies included in the Regulations (2022) and be submitted to the relevant regional authority for approval.
- The completion of annual dam compliance certificates for dams with Medium or High PICs.- The certificates must be prepared by Owners in the prescribed form included in the Regulations (2022), signed by the Owner (if an individual) or by the Owner's Chief Executive (if a body corporate), certified by a Recognised Engineer with the competencies included in the Regulations (2022) and forwarded to the relevant regional authority.
- The development, adoption, and implementation of policies on dangerous dams by regional authorities.
- The completion of annual warrants of fitness where specified systems (e.g. lifts or fire sprinklers) are included in dams. The warrants of fitness must be prepared by Owners and forwarded to the relevant regional authority.

1. The Act (2004) provides for a referable dam category, intended to acknowledge that dams that do not meet the classifiable dam category may still pose a risk to public safety. This provision requires regulation to define what constitutes a referable dam. Referable dams are not defined in the Regulations (2022) and hence this provision is currently dormant.

A visual representation of the dam safety requirements included in Subpart 7 of the Act (2004) is provided by MBIE (2024) and reproduced in Figure 3.2.

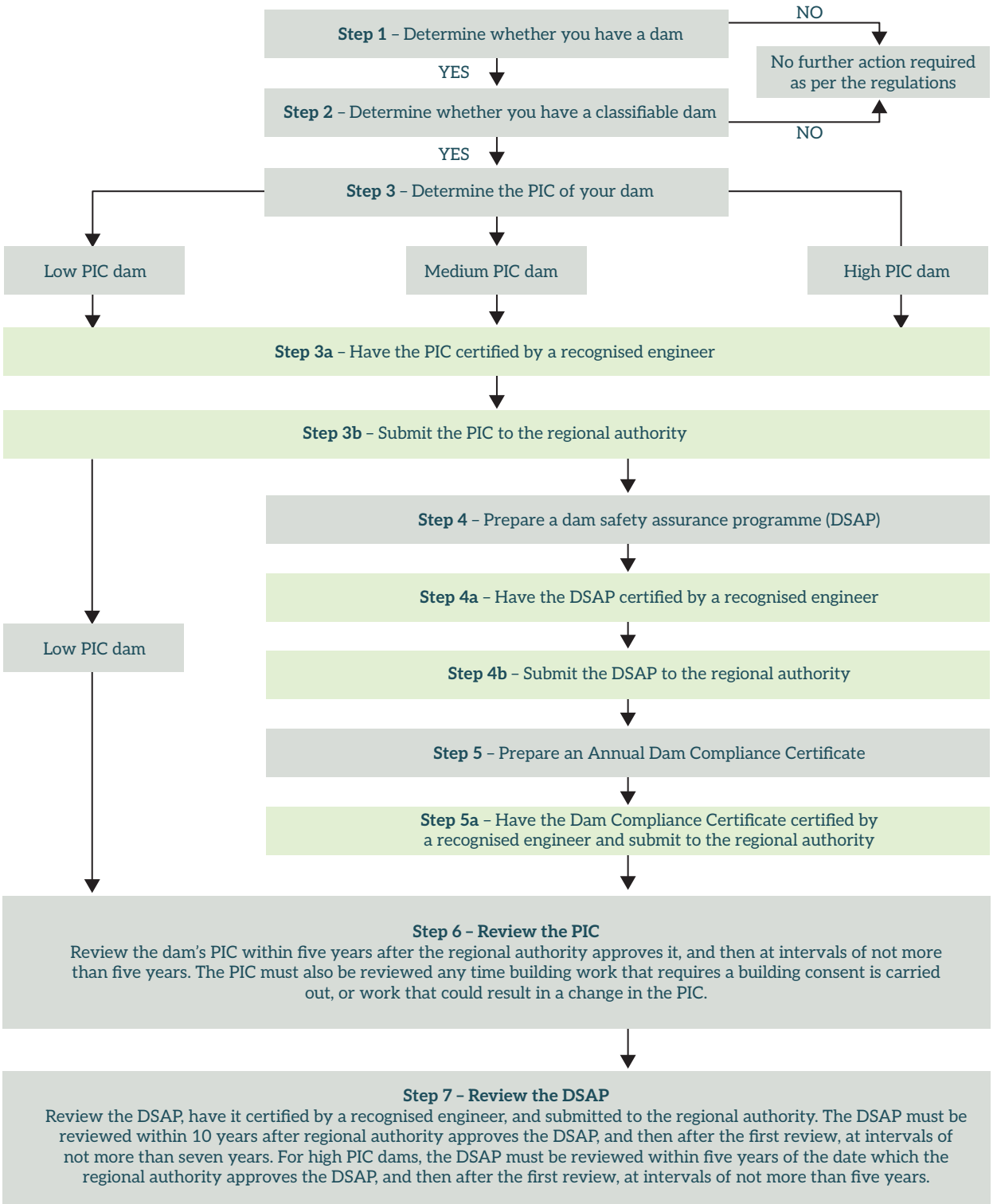


Figure 3.2: Dam Safety Requirements of the Act (2004) (Subpart 7), reproduced from MBIE (2024).

3.3.4 Dangerous dams

Section 153 of the Act (2004) defines dangerous dams as dams with High or Medium PICs that are likely to fail in the ordinary course of events, in a 'moderate earthquake', or in a 'moderate flood'. The terms 'moderate earthquake' and 'moderate flood' are defined in section 19 of the Regulations (2022) and are listed in the Legislative Definitions at the end this module. If a dam is determined to be dangerous, the regional authority can require the Owner to carry out work on the dam within a specified time to reduce or remove the danger. If the work required is not initiated or completed within a reasonable timeframe, the regional authority may also apply to the District Court for an order authorising the regional authority to carry out the required work and recover the costs from the Owner. If a dam is likely to pose an immediate danger to the safety of people, property or the environment, the Chief Executive of a regional authority may issue a warrant to take immediate action to remove the danger.

Owners should be aware that a dam whose strength and capacity previously exceeded the stated thresholds for 'moderate earthquake' and 'moderate flood' events could sustain sufficient damage during a major event that reduced its strength and capacity to levels where it could be considered a dangerous dam.

Acting in accordance with the requirements of the Act (2004), regional authorities have developed policies for dangerous dams within their regions. The policies outline regional authority processes for the identification and assessment of potentially dangerous dams, dealing with dam Owners, and taking action on dangerous dams using the powers included in sections 154 to 159 of the Act (2004). Policies for dangerous dams are available on regional authority websites.

3.3.5 Earthquake-prone and flood-prone dams

Earthquake and flood-prone dams are defined in the Regulations (2022) as High or Medium PIC dams that are likely to fail in a 'threshold event'. Threshold events are defined in section 19 of the Regulations (2022) and are listed in the Legislative Definitions at the end of this module.

The Act (2004) requires regional authorities to develop policies for 'earthquake-prone' and 'flood- prone' dams within their regions. If a dam is 'earthquake-prone' or 'flood-prone', section 146(2)(b) of the Act (2004) enables a regional authority to request a dam Owner to review their dam safety assurance programme.

Owners should be aware that a dam whose strength and capacity previously exceeded the stated thresholds for an 'earthquake-prone' or 'flood-prone' dam could sustain sufficient damage during a major event that reduced its strength and capacity to levels where it could be considered an 'earthquake-prone' or 'flood- prone' dam.

3.4 Building (Dam Safety) Regulations 2022

The Building (Dam Safety) Regulations 2022 (Regulations, 2022) enable the implementation of the legislation requirements relating to classifiable dams contained within the Act (2004). The Regulations (2022) include:

- A framework for the classification of dams, according to the potential downstream effects that would result from a dam failure. The framework is consistent with the intent of these Guidelines and has been adopted for the classification of dams (refer Module 2: Consequence Assessment and Dam Potential Impact Classification).
- Competency requirements for Recognised Engineers, defined in section 149 of the Act (2004) and sections 21–23 of the Regulations (2022).
- Criteria and standards for dam safety assurance programmes.
- Dam classification, dam safety assurance and annual compliance certificate requirements.

The Ministry of Business, Innovation and Employment (MBIE) oversees the Regulations (2022) as the overarching regulator, while regional authorities are responsible for their administration and implementation.

3.4.1 Classifiable dams

The Regulations (2022) were made on 12 May 2022 and came into effect on 13 May 2024. Owners of classifiable dams are required to adhere to the following timeframes:

- Within 3 months, submit classifications for existing classifiable dams to regional authorities for approval (Form 1 of Schedule 3 of the Regulations (2022)).
- Within 3 months after commissioning, submit classifications for new classifiable dams to regional authorities for approval (Form 1 of Schedule 3 of the Regulations (2022)).
- Within 12 months after the dam classification is approved, submit dam safety assurance programmes for High PIC dams to regional authorities (Form 2 of Schedule 3 of the Regulations (2022))
- Within 24 months after dam classification is approved, submit dam safety assurance programmes for Medium PIC dams to regional authorities (Form 2 of Schedule 3 of the Regulations (2022)).
- Annual submission of annual dam compliance certificates High and Medium PIC dams to regional authorities (Form 3 of Schedule 3 of the Regulations (2022)).

Under the Act (2004), Low PIC dams only require classification and submission of the classification to the regional authorities, and 5 yearly review.

3.4.2 Dam Safety Assurance Programme

The Regulations (2022) state that all Medium and High PIC dams are required to have a dam safety assurance programme which must contain effective procedures for:

- Dam and reservoir operations including training of operators, maintaining accurate records of reservoir operation, and maintaining functionality of the dam and reservoir.
- Frequency of surveillance, routine visual inspections, instrument monitoring, data evaluation, and reporting to the dam Owner.
- Requirements for Intermediate dam safety reviews (IDSR).
- Comprehensive dam safety reviews (CDSR).
- Details of an emergency action plan.
- Inspection of appurtenant structures, including testing of gates and valves that contribute to reservoir safety.
- Recording, prioritisation, investigation, assessment, and resolution of dam safety deficiencies.

The Regulations (2022) imply that an acceptable dam safety assurance programme for a dam will be a single document that addresses the items listed above. While this may be appropriate for many Owners, it will be impractical for Owners of dams that incorporate complex facilities and for Owners with large portfolios of dams where dam safety assurance programmes are detailed across a number of documents (e.g. flood management procedures, maintenance and testing procedures for plant and equipment that fulfil dam safety functions, post-earthquake inspection procedures, and emergency preparedness procedures). In such cases, it would seem appropriate for Owners to submit summary documents that set out the elements included within their dam safety assurance programmes and refer to supporting documents that detail the processes and activities.

3.4.3 Recognised Engineers

The Act (2004) requires the certification of dam classifications, dam safety assurance programmes, and annual dam compliance certificates by Recognised Engineers. The Act (2004) defines a Recognised Engineer as someone who has no financial interest in the dam, is registered under the Chartered Professional Engineers of New Zealand Act 2002, meets the competency requirements listed in the Regulations (2022), and must be assessed and registered as a Recognised Engineer by Engineering New Zealand Te Ao Rangahau as the Registration Authority. In carrying out their duties, a Recognised Engineer is required to follow ethical principles such as not working outside their area of expertise or level of experience.

There are two categories of Recognised Engineer detailed in the Regulations (2022);

- PIC Recognised Engineer (RecEng PIC).
- DSAP Recognised Engineer (RecEng DSAP).

A Recognised Engineer can be either, or both. Qualification and competency requirements for Recognised Engineers are detailed in sections 21, 22 and 23 of the Regulations (2022). Assessment and registration of Recognised Engineers is managed by Engineering New Zealand. Additional information relating to Recognised Engineers, including how to become accredited and how to find a Recognised Engineer can be found on the **Engineering New Zealand website**

Key reference documents provided by Engineering New Zealand are:

- **Recognised Engineer Competency Framework (Dam Safety) – Knowledge Base** (Engineering New Zealand, 2023a).
- **Recognised Engineer (Dam Safety) – Guide to Assessments** (Engineering New Zealand, 2023b).
- **Recognised Engineers – Liability Considerations** (Engineering New Zealand, 2023c).

The Recognised Engineer role is limited to the certification of dam classifications, dam safety assurance programmes and annual dam compliance certificates. Recognised Engineers may, or may not, be suitably qualified and experienced to fulfil a dam design role or address a dam safety deficiency.

3.4.4 Compliance with the Act (2004) and the Regulations (2022)

The MBIE publication 'Guide to complying with the Dam Safety Regulations' (MBIE 2024) should be the first reference for guidance and interpretation relating to the Act (2004) and Regulations (2022). This document, and other regulatory guidance, is available from MBIE's **Building Performance website**. The purpose of the document is to "...support the understanding of the Building (Dam Safety) Regulations 2022 (the regulations) for dam Owners, technical practitioners and regional authorities, and to provide guidance to assist preparing for and fulfilling the requirements of the regulations".

As outlined in the previous sections, the Act (2004) requires the certification of dam classifications and dam safety assurance programmes for High and Medium PIC dams by Recognised Engineers. The Regulations (2022) include a specified methodology for the determination of dam classifications, and criteria and standards for dam safety assurance programmes which provide a basis for Recognised Engineers to certify dam classifications and certify dam safety assurance programmes.

The Act (2004) also requires the certification of annual dam compliance certificates for High and Medium PIC dams by a Recognised Engineer. The Regulations (2022) require the compliance certificate to be in a specific form and contain specific information, and certification that all procedures of the dam safety assurance programme have been complied with "except for any identified, minor items of non-compliance" (MBIE, 2024). The Recognised Engineer Competency Framework (Dam Safety) – Knowledge Base (Engineering New Zealand, 2023a) provides guidance on the types of information that are required in order for a Recognised Engineer to certify annual dam compliance certificates.

It is important for Owners to be aware that the Act (2004) and Regulations (2022) require substantive compliance. Accordingly, Owners should ensure that their programmes incorporate sufficient flexibility to accommodate possible delays in the completion of work activities. Possible disruptive factors could include extreme weather conditions, floods, staff leave, and the upgrading or repair of an item of equipment that fulfils a dam safety function.

3.5 Building Regulations 1992 (Building Code)

The Building Regulations 1992 requires all buildings, including dams, to achieve specific performance criteria depending on the classified use or uses of the building.

Seven building types and classified uses are listed in Clause A1 of Schedule 1 of the Building Regulations (the Building Code) and those most relevant to dams are industrial buildings, outbuildings and ancillary buildings. Building importance levels are specified and the Building Code includes a number of performance criteria relating to stability, fire safety, access, moisture, the safety of users, services and facilities, and energy efficiency.

While dams and their associated facilities (e.g. appurtenant structures, power stations, pumping stations) are required to meet all relevant requirements of the Building Code, the performance criteria that are most relevant to dams are those that relate to the structure, the durability of the structure, access, safety from falling, and warning systems and signs.

3.6 Electricity Act 1992

Included within the Electricity Act 1992 are requirements for electricity generators and electricity suppliers in relation to public safety and prevention of damage to property. Section 61A of the Electricity Act 1992 contains requirements for safety management systems. Depending on the scale of generation, these requirements may extend to dams and waterbodies associated with electricity generation. The Electricity (Safety) Regulations 2010 provide further requirements for safety management systems including documentation, audits, certification, and offences.

Owners of dams used as part of electricity generation need to ensure they understand the scope and requirements of the Electricity Act 1992 to determine their obligations.

3.7 Water Services Act 2021

Part 2 of the Water Services Act 2021 contains provisions relating to supply of drinking water. Sections 25 and 26, in particular, set out the duty of drinking water suppliers to provide sufficient quantity of drinking water, as well as duties where sufficient supply is at risk. Various aspects of the dam safety management system for Owners of water supply dams are likely to be relevant to these duties, such as operating procedures and emergency preparedness. Owners should ensure they are familiar with their duties under the Water Services Act 2021 and incorporate these into the operation, maintenance, and lifecycle management of their dams.

4. Interpretation of legal requirements

As noted previously, the MBIE publication 'Guide to complying with the Dam Safety Regulations' (MBIE 2024) should be the first reference for interpretation relating to the Act (2004) and Regulations (2022) and is available from MBIE's **Building Performance website**.

The following subsections provide some guidance to assist in the interpretation of specific aspects of the Act (2004) and the Regulations (2022). When interpreting legal requirements, it is important to recognise that the overriding intent of the legislation relating to dam safety is the protection of people and property downstream of the dam and that, accordingly, any assessment is made with appropriate consideration of the potential consequences.

Insoluble differences in the interpretation of terminology and the application of the Act (2004) or Regulations (2022) (say between an Owner and a regional authority) can be resolved using the MBIE determination process.

4.1 Dam measurement

Dam height and reservoir volume are required measurements under the Act (2004) for registering dams and to determine if they require classification. The overarching reason for measurement is to identify those dams with sufficient height and reservoir content to pose a risk to people, property and the environment downstream of the dam.

4.1.1 Dam height

The Act (2004) defines the height of the dam as "the vertical distance from the crest of the dam and must be measured:

(a) in the case of a dam across a stream, from the natural bed of the stream at the lowest downstream outside limit of the dam; and

(b) in the case of a dam not across a stream, from the lowest elevation at the outside limit of the dam; and

(c) in the case of a canal, from the invert of the canal.

The crest of the dam for the purposes of measuring height is also defined in the Act (2004) as

> **... the uppermost surface of a dam, not taking into account any camber allowed for settlement, or any curbs, parapets, guard rails, or other structures that are not part of the water-retaining structure; and for the avoidance of doubt, any freeboard is part of the water- retaining structure for the purposes of this definition.**

The intent behind the legislative requirements is for the height to be determined in a straightforward and economic manner. It may be possible to measure the height of the dam in the field, or by reference to construction drawings showing the stream or river bed level.

4.1.2 Reservoir volume

Questions about measurement of the volume of a reservoir can arise when a dam volume is close to the threshold for dam classifications.

Bathymetry, pre-construction ground contours, or as-built ground contours (where fill for dam construction has been obtained from the reservoir area) provide the most accurate means for determining the volume of a reservoir. Anything less rigorous will only provide an estimate of the reservoir volume.

If bathymetry information, pre-construction ground contours, or as-built ground contours are not available, a coarse estimate of the reservoir surface area and volume can be obtained using the simplified methodology described by MBIE (2024). The methodology is summarised in Figure 4.1; however, if the reservoir shape is complex and does not closely match a shape shown in Figure 4.1, other methods should be used to estimate the reservoir volume.

For all of the above methodologies, the volume of the reservoir should reflect the maximum hazard. Note that the dam crest definition included in the Act (2004) says:

> **... for the avoidance of doubt, any freeboard is part of the water-retaining structure...**

This indicates that the crest of the dam should be used to determine the reservoir surface area, depth and volume.

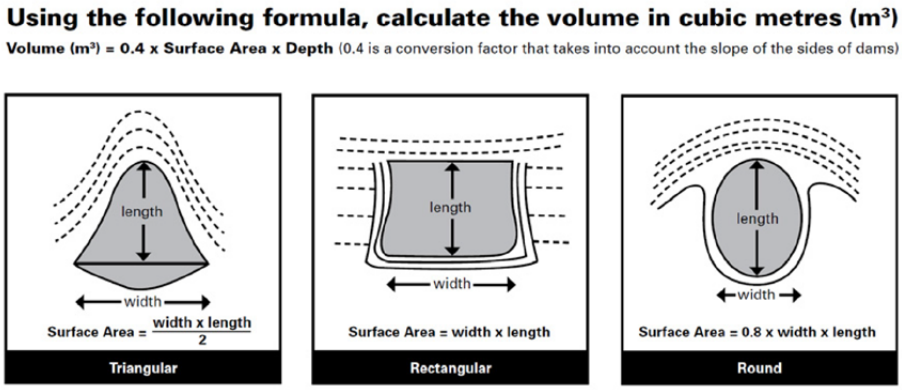


Figure 4.1: Simplified Calculation of Reservoir Volume. Source (MBIE, 2024)

4.2 Applying PICs to dam structures

The limits of a dam are usually defined by the natural country forming the abutments and the Act (2004) requires only one PIC per dam. This implies that different components of the same dam cannot have different PICs. However, section 134BA of the Act does recognise the special case of a canal where different sections of a canal can have different PICs. Fill embankments between natural country where the canal is in cut, can be treated as separate dams, and therefore assigned different PICs that reflect the consequences of their failure. In addition, although unstated in the Act (2004), the two sides of a fill embankment on a canal could be assigned different PICs if the consequences of their failure were different (refer Module 2 of the Guidelines), but only if the failure of one side of the canal did not initiate a failure of the other side of the canal.

Secondary or saddle dams impounding the same reservoir as the main dam can have separate PICs to the main dam if the consequences of their failure are different (refer Module 2 of the Guidelines) and their failure does not initiate a failure of the main dam. Similarly, although unstated in the Act (2004), appurtenant structures separated from the dam could also have different PICs from the dam if the consequences of their failure were different and their failure did not initiate a failure of the dam.

Dam Owners should be aware that the PIC of a dam can change with time. An increase in a dam's PIC could necessitate rehabilitation works to ensure the dam can safely accommodate the increased loadings associated with the higher PIC. For example, community development downstream of a dam could increase its PIC from Medium to High, requiring rehabilitation to ensure the spillway facility can safely accommodate the Probable Maximum Flood (PMF). The costs of any necessary improvement or rehabilitation works would need to be met by the Owner.

The Act (2004) explicitly uses the PIC of a dam for the administration of legislation relating to dam safety assurance programmes and dam compliance certificates, and the identification of dangerous, earthquake-prone and flood-prone dams. It does not use the PIC of a dam to direct the scope of design activities necessary for obtaining a building consent. New Zealand has for many years used PIC as the basis for dam design and this is accepted national practice. It is also similar in principle to international practice. These Guidelines continue that tradition, but the reader needs to clearly understand how the PIC is applied in dam design (refer to Module 3 of the Guidelines) in comparison to how it is applied in the legislation.

4.3 Identification of appurtenant structures

The Act (2004) defines an appurtenant structure as "...a structure that is integral to the safe functioning of the dam as a structure for retaining water or other fluid". This is interpreted to be primarily about the safe containment of the reservoir and the safe control of discharges from the reservoir and, as such, appurtenant structures are those structures at the dam site, other than the dam itself, that are designed and are required for the safe containment and control of the reservoir contents under all loading conditions.

Owners are required to include a list of all appurtenant structures in their dam safety assurance programmes for Medium and High PIC dams. Therefore, it is necessary to clearly demarcate between appurtenant structures and other facilities at the dam that are not essential for the retention of the reservoir and the safe operation of the dam.

Typical appurtenant structures include spillways, penstock intake structures, water intake structures, canal inlet structures, and low level outlet structures which have been designed to retain the reservoir and/ or fulfil a dam safety function (e.g. to discharge flood events or lower the reservoir level in a dam safety emergency). Appurtenant structures often incorporate mechanical and electrical plant (e.g. gates, valves, standby generators) for the controlled discharge or release of the reservoir contents, and equipment for the operation of the plant (e.g. power supplies, communication systems, control and protection systems).

Outlet facilities which do not retain the reservoir and are not required to fulfil a dam safety function are not appurtenant structures. If a pipeline or penstock is not required to fulfil a dam safety function and is protected by an upstream gate or valve that can close against flow, the pipeline or penstock is not an appurtenant structure; however, the upstream gate or valve facility is an appurtenant structure. If there is no upstream gate or valve facility, then the pipeline or penstock and all components of the water passage down to the next control gate or valve is an appurtenant structure.

Buildings that house equipment that fulfils dam safety functions (e.g. PLCs, communication and control equipment, standby generators) are not appurtenant structures if adequate backup facilities are available for operation of the equipment. Where no backup facilities are available for operation of the equipment, the buildings that house the equipment are appurtenant structures.

Diversion drains may fit the definition of an appurtenant structure for some water storage dams and tailings dams if they serve a dam safety function.

Clearly, Owners need to carefully consider the specific arrangements at each dam site and identify all structures that fulfil dam safety functions. The overriding consideration must be the safe retention and control of the reservoir contents, which is not necessarily the same as normal operation of the facility. Further guidance on the investigation, design and analysis of appurtenant structures is provided in Module 3 of these Guidelines.

Legislative definitions

The following definitions, which relate to terms used in this module of the Guidelines, are extracted directly from the Act (2004) and the Regulations (2022).

Appurtenant structure
In relation to a dam, means a structure that is integral to the safe functioning of the dam as a structure for retaining water or other fluid

Building work
(a) means work that is either of the following:
  (i) for, or in connection with, the construction, alteration, demolition, or removal of a building:
  (ii) on an allotment that is likely to affect the extent to which an existing building on that allotment complies with the building code; and
(b) includes sitework; and
(c) includes design work (relating to building work) that is design work of a kind declared by the Governor-General by Order in Council to be restricted building work for the purposes of this Act (see subsection (2)); and
(d) in Part 4, and the definition in this section of supervise, also includes design work (relating to building work) of a kind declared by the Governor-General by Order in Council to be building work for the purposes of Part 4 (see subsection (2)); and
(f) includes the manufacture of a modular component

Classifiable dam
For the purposes of the Act, classifiable dam means a dam that has a height of 4 or more metres and stores 20,000 or more cubic metres volume of water or other fluid

Crest of a dam
In relation to a dam, means the uppermost surface of a dam, not taking into account any camber allowed for settlement, or any curbs, parapets, guard rails, or other structures that are not part of the water-retaining structure; and for the avoidance of doubt, any freeboard is part of the water- retaining structure for the purposes of this definition.

Dam –
(a) means an artificial barrier, and its appurtenant structures, that –
  (i) is constructed to hold back water or other fluid under constant pressure so as to form a reservoir; and
  (ii) is used for the storage, control, or diversion of water or other fluid.
(b) includes –
  (i) a flood control dam; and
  (ii) a natural feature that has been significantly modified to function as a dam; and
  (iii) a canal; but
(c) does not include a stopbank designed to control floodwaters.

Dangerous dam
A dam is dangerous for the purposes of this Act if the dam:

(a) is a high potential impact dam or a medium potential impact dam; and

(b) is likely to fail –

(i) in the ordinary course of events; or

(ii) in a moderate earthquake (as defined in the regulations); or

(iii) in a moderate flood (as defined in the regulations).

Earthquake-prone dam
A dam is an earthquake- prone dam for the purposes of this Act if the dam:

is a high potential impact dam or a medium potential impact dam; and

is likely to fail in an earthquake threshold event (as defined in the regulations).

Earthquake threshold event
For the purpose of section 153A of the Act (meaning of earthquake-prone dam and flood-prone dam),-

(a) in relation to a high potential impact dam, an earthquake that would result in ground shaking, at the site of the dam, at an intensity with an AEP of 1 in 500 (determined by normal measures of acceleration, velocity, and displacement) but not less than the 1 in 500 AEP shaking determined using a seismic hazard factor (Z factor) of 0.10; and

(b) in relation to a medium potential impact dam, an earthquake that would result in ground shaking, at the site of the dam, at an intensity with an AEP of 1 in 250 (determined by normal measures of acceleration, velocity, and displacement) but not less than the 1 in 250 AEP shaking determined using a seismic hazard factor (Z factor) of 0.10

Flood-prone dam
A dam is a flood-prone dam for the purposes of this Act if the dam:

(a) is a high potential impact dam or a medium potential impact dam; and

(b) is likely to fail in a flood threshold event (as defined in the regulations.

Flood threshold event means –

(a) in relation to a high potential impact dam, a flood that would result in water or other fluid flowing, into the reservoir formed by the dam, at a flow rate with an AEP of 1 in 500; and

(b) in relation to a medium potential impact dam, a flood that would result in water or other fluid flowing, into the reservoir formed by the dam, at a flow rate with an AEP of 1 in 250.

Large dam
Means a dam that has a height of 4 or more metres, and holds 20,000 or more cubic metres volume, of water or other fluid.

Lifeline utility
As defined in the Civil Defence and Emergency Management Act 2002: means an entity named or described in Part A of Schedule 1, or that carries on a business described in Part B of Schedule 1. A list of lifeline utilities is included in Part A of Schedule 1 in the Act. Part B of Schedule 1 in the Act includes entities that generate electricity for distribution through a network and entities that supply or distribute water as 'lifeline utilities'.

Moderate earthquake
in relation to a high potential impact dam, means an earthquake that would result in ground shaking, at the site of the dam, at an intensity with an AEP of 1 in 100 (determined by normal measures of acceleration, velocity, and displacement) but not less than the 1 in 100 AEP shaking determined using a seismic hazard factor (Z factor) of 0.10; and

in relation to a medium potential impact dam, means an earthquake that would result in ground shaking, at the site of the dam, at an intensity with an AEP of 1 in 50 (determined by normal measures of acceleration, velocity, and displacement) but not less than the 1 in 50 AEP shaking determined using a seismic hazard factor (Z factor) of 0.10.

Moderate flood
(a) in relation to a high potential impact dam, means a flood that would result in water or other fluid flowing into the reservoir formed by the dam at a flow rate with an AEP of 1 in 100; and

(b) in relation to a medium potential impact dam, means a flood that would result in water or other fluid flowing into the reservoir formed by the dam at a flow rate with an AEP of 1 in 50.

Population at Risk
means the number of people likely to be affected by an uncontrolled release of all or part of the stored water or other fluid due to a failure of the dam (assuming that no person takes any action to evacuate)

Recognised engineer
In relation to a dam, means an engineer who meets the requirements in section 149 of the Building Act. Section 149 of the Building Act states that –

1. A recognised engineer is an engineer who –
   (a) has no financial interest in the dam concerned; and
   (b) is registered under the Chartered Professional Engineers of New Zealand Act 2002; and
   (c) has –
      (i) the prescribed qualifications; and
      (ii) the prescribed competencies.
2. In subsection (1)(a), financial interest does not include –
   (a) involvement in the construction of the dam as a fully paid engineer; or
   (b) entitlement to a fee for undertaking an audit.

Note – Refer to sections 21, 22 and 23 of the Building (Dam Safety) Regulations for the prescribed qualifications and competencies referred to in subsection 1(c) of Recognised Engineer.

Regional authority
(a) regional council.

(b) a unitary authority.

Regional council
As defined by section 5(1) of the Local Government Act 2002.

Territorial authority
A city council or district council named in Part 2 of Schedule 2 of the Local Government Act 2002

Unitary authority
As defined by section 5(1) of the Local Government Act 2002

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Society on Large Dams

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