



Dangerous Dams Policy 2011

(including earthquake-prone and flood-prone dams)

- Building Act 2004

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1. Introduction

Section 161 of the Building Act 2004 (the Act) requires regional authorities (RA's) to adopt a policy on dangerous dams. Section 161 of the Act requires the policy to be reviewed at intervals of not more than five years. Greater Wellington adopted a Dangerous Dams policy in *October 2006*. It is now time to review that policy.

Amendments to the Act in 2008 introduced two additional categories of dam; earthquake-prone and flood-prone. Section 161 of the Act requires now also requires Greater Wellington to develop a policy on these categories of dam.

This policy therefore addresses dangerous dams, earthquake prone and flood prone dams.

The Building (Dam Safety) Regulations 2008, that prescribe the criteria for dam classification, come into force on 1 July 2012. Regulations that prescribe the standards and criteria for determining moderate and threshold event earthquakes and floods in section 153 and 153A of the Act, are yet to be finalised. These standards and criteria are key components of the Dangerous Dams Policy.

The Dangerous Dams Policy 2011 will come into effect three months after:

- the Building (Dam Safety) Regulations 2008 come into force, and
- regulations prescribing the criteria and standards to determine dangerous, earthquake prone or flood prone dams come into force.

The Dangerous Dams Policy 2011 will not be reviewed as a result of regulations prescribing the standards and criteria to determine dangerous, earthquake prone or flood prone dams coming in to force. The regulations will simply be applied to the policy as it is.

2. Definition of dam

The 2008 amendments to the Act also altered the definition of dam by repealing the height and volume from the definition of dam and introducing a 'large dam' category where the height and volume are stipulated.

For the purposes of this policy, the term 'dam' and 'large dam' have the same meaning as defined in section 7 of the Building Act 2004. The full text of the definitions state:

Dam -

- a. *means an artificial barrier, and its appurtenant structures, that –*
 - a. *is constructed to hold back water or other fluid under constant pressure so as to form a reservoir; and*

- b. *is used for the storage, control, or diversion of water or other fluid; and*
- b. *includes –*
 - i. *flood control dam; and*
 - ii. *natural feature that has been significantly modified to function as a dam; and*
 - iii. *a canal; but*
- c. *does not include a stop bank designed to control floodwaters”.*

large dam *means a dam that retains 3 or more metres depth, and holds 20 000 or more cubic metres volume, of water or other fluid*

Section 133A of the Act stipulates that most of the provisions of subpart 7 – safety of dams, only apply to large dams.

133A Dams to which subpart 7 provisions apply

1 Sections 157 to 159 apply to all dams.

2 The other provisions in this subpart apply only to large dams

The dangerous dam, earthquake-prone and flood-prone policy will therefore only apply to ‘large dams’.

Note: The definition of **large dam** is currently under review. Any changes amendments to the definition in the Act will not require this policy to be reviewed. The new definitions will simply replace the existing.

3. Definition of dangerous dam

The definition of what constitutes a dangerous dam is set out in section 153 of the Act.

A dangerous dam is a medium or high potential impact dam that:

- a. *is likely to fail:*
 - i. *in the ordinary course of events; or*
 - ii. *in a moderate earthquake; or*
 - iii. *in a moderate flood.*

The Building (Dam Safety) Regulations 2008 prescribe the potential impact classifications for large dams. A copy of the regulations is attached in Appendix 2.

4. Definition of earthquake-prone and flood-prone dams

Section 153A of the Act sets out the definitions for earthquake-prone and flood-prone dams. As with the dangerous dam definition, regulations are required to further define the definitions.

- (1) *A dam is an earthquake-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 an earthquake threshold event (as defined in the regulations).*
- (2) *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).*

5. Policy development and legislative requirements

In reviewing and adopting the dangerous dams' policy and developing a policy on earthquake-prone and flood-prone dams, Greater Wellington is required to follow the special consultative procedure set out in section 83 of the Local Government Act 2002. Greater Wellington will undertake the review process in conjunction with the councils Annual Plan.

Section 161 requires the policy to state:

- a) The approach that the regional authority will take in performing its functions in respect of dangerous dams under the Act, and
- b) The regional authority's priorities in performing these functions, and
- c) How the policy will apply to heritage dams

6. Policy approach

6.1 Policy principles and objectives

The purpose of the Act is to provide for the regulation of building work, and in relation to dams, establish a dam safety scheme. The intent of the Act is to improve control and encourage better practice in the construction of buildings (including dams) and to minimise the potential risks to people and property from dangerous dams.

The dangerous dam, earthquake prone and flood prone provisions of the Act give regional authorities powers to act in situations where a dam does not meet standards and criteria and the owner has not taken appropriate action.

6.2 Identification of dams that may be dangerous, earthquake prone or flood prone

Greater Wellington will adopt a proactive approach to identify dams that may be dangerous, earthquake prone or flood prone by ensuring all large dams are investigated and inspected by a suitably qualified technical specialist **once every five years**, unless:

- The owner of the dam is an accredited dam owner within the meaning of the Act, or
- The dam is physically inspected by a suitably qualified technical specialist as part of the dam safety scheme specified in the Act, and Greater Wellington has received a **complying** Annual dam compliance certificate for that dam within the last 12 months.

At any time, the Greater Wellington may also investigate a whether a dam is dangerous, earthquake prone or flood prone if:

- Complaints are received about a dam, or
- Information received under the Building (Dam Safety) Regulations 2008 highlight areas of concern, or
- Through related work e.g. RMA, Greater Wellington becomes concerned about a dam

Newly constructed dams will be subject to the policy once their dam safety assurance programme has been approved under section 143 of the Act.

Note: Greater Wellington is required to maintain a register of large dams under section 151 of the Act. When a newly constructed dam receives a code of compliance certificate, the dam will be added to the register.

6.3 Assessment of identified dams

Where a dam has been identified under section 6.2 above, Greater Wellington will, without delay, undertake an assessment of the risk and if necessary undertake further assessment of the dam to verify its condition.

Greater Wellington will consult with the dam owner before undertaking further assessment of a dam, as the cost of the assessment will be borne by the dam owner. The dam owner, may however, provide their own assessment, provided a timeframe to undertake the assessment and a suitably qualified technical specialist can be agreed upon with Greater Wellington.

Assessment of a dam's condition will be undertaken by a suitably qualified technical specialist who will inspect and assess the dam against the definitions in the Act and subsequent regulations that prescribe the standards and criteria for dangerous, earthquake prone and flood prone dams. 'The New Zealand Dam Safety Guidelines (2000)', or any subsequent update or recognised replacement for that guideline, will be used for further guidance in determining if a dam is dangerous, earthquake prone or flood prone.

Dam owners will be advised in writing as to whether their dam has been classified as dangerous, earthquake prone or flood prone.

6.4 Dispute of dangerous, earthquake prone or flood prone dam classification

Greater Wellington will write to and meet with (if requested) an owner of a dam that has been classified as dangerous, earthquake prone or flood prone. Owners will have 20 working days to consider Greater Wellington's assessment and provide any information on the performance to the dam that may influence the assessment.

Greater Wellington, where appropriate, will use technical specialists to review the information provided by the dam owner. If Greater Wellington is then satisfied that the dam is not dangerous, earthquake prone, or flood prone, the status of the dam will be changed and the owner advised.

However, should Greater Wellington still consider a dam have a dangerous, earthquake prone, or flood prone classification, the dam owner can apply for a 'Determination' pursuant to section 177 of the Act from the Chief Executive of the Department of Building and Housing. The Chief Executive's determination is binding on Greater Wellington and the dam owner.

6.5 Costs incurred by the dam owner

Where Greater Wellington undertakes any assessment of a dam that may be dangerous, earthquake prone or flood prone, the dam owner will pay the actual and reasonable costs of the assessment.

If there is a dispute regarding a dam's dangerous, earthquake prone or flood prone classification, parties will bear their own costs.

The cost of any work Greater Wellington requires a dam owner to carry out on their dam as a result of this policy will be borne by the dam owner. Where Greater Wellington carries out work on a dam under sections 154-156 of the Act, Greater Wellington will recover costs from the dam owner and if necessary recover the costs by placing a charge on the land on which the dam is situated.

6.6 Prioritisation

The table below sets out Greater Wellington's priorities for dealing with dams that have been assessed as being dangerous, earthquake prone or flood prone.

	Dangerous Dam	Earthquake Prone	Flood Prone
High Potential Impact	High	Medium	Medium
Medium Potential Impact	High	Low	Low

6.7 Taking action

Using the priorities above, Greater Wellington will undertake the following actions with respect to dangerous, earthquake prone or flood prone dams:

High – Greater Wellington will invoke sections 154 – 156 of the Act to remove or reduce the danger.

Medium – Greater Wellington will work with the dam owner to establish a formal programme of work to remove or reduce the danger and will require the dam owner to undertake a review of their dam safety programme (section 146(2)(b)).

Low – Greater Wellington will require the dam owner to review their dam safety assurance programme (section 146(2)(b)).

However, if at any time, the Greater Wellington determines that the dam poses immediate danger to the safety of persons, property or the environment, Greater Wellington will take action under section 157 to 159 of the Act. Greater Wellington will make every effort to contact and liaise with the dam owner prior to invoking these provisions.

6.8 Action requiring consent(s)

When building consents or resource consents are necessary for action to reduce or remove danger required:

- in a notice served by council; or
- in a formal proposal supplied by the dam owner;

Greater Wellington will expedite the required consents(s) where practicable.

6.9 Dealing with dam owners

Greater Wellington will endeavour to consult with dam owners regarding the form of any necessary work to remove or reduce the danger, with the purpose of obtaining a mutually agreed approach to dealing with the risk.

6.10 Heritage dams

For the purposes of this policy, a heritage dam (including associated structures) includes all dams listed as a heritage resource in the relevant territorial authority's District Plan and/or those registered by the New Zealand Historic Places Trust (NZHPT).

Greater Wellington recognises the need to retain heritage fabric, but also the need to reduce or remove the danger posed by a dam to mitigate the risk of loss of life or damage to property in the event of a collapse. When considering heritage dams under this policy, account will be taken of the need to facilitate the preservation of dams with significant cultural, historical, or heritage value.

When dealing with dangerous heritage dams, Greater Wellington will seek advice from the NZHPT and the relevant territorial authority (if appropriate)

before any actions are undertaken by the regional authority under sections 153 – 160 of the Act. Greater Wellington may engage suitably qualified professionals with heritage expertise to advise and recommend actions. Copies of all served notices will be provided to the NZHPT.

6.11 Recording a dam's status

Section 151 of the Act requires Greater Wellington to keep a register of dams. The status of a dam (dangerous, earthquake prone, or flood prone) will be recorded on the register, as will the dams heritage status.

Where improvements are made to a dam and Greater Wellington is satisfied the dam is no longer, dangerous, earthquake prone or flood prone, the register will be updated to reflect the new status.

APPENDIX 1 – Relevant Legislation

BUILDING ACT 2004 – KEY SECTIONS

3. Purpose

The purpose of this Act is to provide for the regulation of building work, the establishment of a licensing regime for building practitioners, and the setting of performance standards for buildings, to ensure that—

- (a) people who use buildings can do so safely and without endangering their health; and
- (b) buildings have attributes that contribute appropriately to the health, physical independence, and well-being of the people who use them; and
- (c) people who use a building can escape from the building if it is on fire; and
- (d) buildings are designed, constructed, and able to be used in ways that promote sustainable development.

146. Review of dam safety assurance programme

- (1) An owner of a dam to whom section 140 applies must review the dam safety assurance programme of a dam,—
 - (a) in the case of a dam that has been classified as a high potential impact dam,—
 - (i) within 5 years after the date on which the regional authority approves, or is deemed to approve, the dam safety assurance programme; and
 - (ii) after the first review, at intervals of not more than 5 years; and
 - (b) in the case of a dam that has been classified as a medium potential impact dam,—
 - (i) within 10 years after the date on which the regional authority approves, or is deemed to approve, the dam safety assurance programme; and
 - (ii) after the first review, at intervals of not more than 5 years.
- (2) The owner must also review the dam safety assurance programme—
 - (a) if, at any time,—

- (i) building work that requires a building consent is carried out on the dam; and
 - (ii) the building work results, or could result, in a change to the potential impact of the dam on persons, property, or the environment; or
- (b) when requested by the regional authority to do so, if the dam is an earthquake-prone dam or a flood-prone dam.
- (3) Sections 142 and 143 apply, with all necessary modifications, to a reviewed dam safety assurance programme.

153. Meaning of 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)

153A Meaning of earthquake-prone dam and flood-prone dam

- (1) A dam is an earthquake-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 an earthquake threshold event (as defined in regulations).
- (2) A dam is an 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 regulations).

154. Powers of regional authorities in respect of dangerous dams

- (1) If a regional authority is satisfied that a dam is dangerous, the regional authority may—
 - (a) put up a hoarding or fence to prevent people from approaching the dam nearer than is safe:

- (b) attach in a prominent place on, or adjacent to, the dam a notice that warns people not to approach the dam:
 - (c) give written notice requiring work to be carried out on the dam, within a time stated in the notice (which must not be less than 10 days after the notice is given under section 155), to reduce or remove the danger.
- (2) This section does not limit the powers of a regional authority under this Part.
 - (3) A person commits an offence if the person fails to comply with a notice given under subsection (1)(c).
 - (4) A person who commits an offence under this section is liable to a fine not exceeding \$200,000.

155. Requirements for notice given under section 154

- (1) A notice given under section 154(1) (c) must—
 - (a) be fixed to the dam concerned; and
 - (b) state whether the owner of the dam must obtain a building consent in order to carry out the work required by the notice.
- (2) A copy of the notice must be given to—
 - (a) the owner of the dam; and
 - (b) an occupier of the dam; and
 - (c) every person who has an interest in the land on which the dam is situated under a mortgage or other encumbrance registered under the Land Transfer Act 1952; and
 - (d) every person claiming an interest in the land that is protected by a caveat lodged and in force under section 137 of the Land Transfer Act 1952; and
 - (e) any statutory authority, if the land or dam has been classified; and
 - (f) the New Zealand Historic Places Trust, if the dam is a heritage dam.
- (3) However, the notice, if fixed on the dam, is not invalid because a copy of it has not been given to any or all of the persons referred to in subsection (2).

156. Regional authority may carry out work

- (1) A regional authority may apply to a District Court for an order authorising the regional authority to carry out building work if any work required under a notice given by the regional authority under section 154(1)(c) is not completed, or not proceeding with reasonable speed, within—
 - (a) the time stated in the notice; or
 - (b) any further time that the regional authority may allow.
- (2) Before the regional authority applies to a District Court under subsection (1), the regional authority must give the owner of the dam not less than 10 days' written notice of its intention to do so.
- (3) If a regional authority carries out building work under the authority of an order made under subsection (1),—
 - (a) the owner of the dam is liable for the costs of the work; and
 - (b) the regional authority may recover those costs from the owner; and
 - (c) the amount recoverable by the regional authority becomes a charge on the land on which the dam is situated.

157. Measures to avoid immediate danger

- (1) This section applies if, because of the state of a dam, immediate danger to the safety of persons, property, or the environment is likely.
- (2) The chief executive of a regional authority may, by warrant issued under his or her signature, cause any action to be taken that is necessary in his or her judgment to remove that danger.
- (3) If the regional authority takes action under subsection (2),—
 - (a) the owner of the dam is liable for the costs of the action; and
 - (b) the regional authority may recover those costs from the owner; and
 - (c) the amount recoverable by the regional authority becomes a charge on the land on which the dam is situated.
- (4) The chief executive of the regional authority and the regional authority are not under any liability arising from the issue, in good faith, of a warrant under subsection (2).

158. Regional authority must apply to District Court for confirmation of warrant

- (1) If the chief executive of a regional authority issues a warrant under section 157(2), the regional authority, on completion of the action stated in the warrant, must apply to a District Court for confirmation of the warrant.
- (2) On hearing the application, the District Court may—
 - (a) confirm the warrant without modification; or
 - (b) confirm the warrant subject to modification; or
 - (c) set the warrant aside.
- (3) Subsection (1) does not apply if—
 - (a) the owner of the dam concerned notifies the regional authority that—
 - (i) the owner does not dispute the entry into the owner's land; and
 - (ii) confirmation of the warrant by a District Court is not required; and
 - (b) the owner pays the costs referred to in section 157(3)(a).

159. Building work includes decommissioning and demolition of dam

Any work required or authorised to be carried out under section 154(1)(c), or action taken under section 157, may include the decommissioning and demolition of a dam.

160. Power of regional authority not limited

The provisions of sections 154 to 159 are in addition to, and do not limit, the powers of a regional authority under section 157.

161. Regional authority must adopt policy on dangerous dams

- (1) A regional authority must, within 18 months after the commencement of this Part, adopt a policy on dangerous dams, earthquake-prone dams, and flood-prone dams within its region.
- (2) The policy must state—
 - (a) the approach that the regional authority will take in performing its functions under this Part; and
 - (b) the regional authority's priorities in performing those functions; and

- (c) how the policy will apply to heritage dams.

162. Adoption and review of policy

- (1) A policy under section 161 must be adopted in accordance with the special consultative procedure in section 83 of the Local Government Act 2002.
- (2) A policy may be amended or replaced only in accordance with the special consultative procedure, and this section applies to that amendment or replacement.
- (3) A regional authority must, as soon as practicable after adopting or amending a policy, provide a copy of the policy to the chief executive.
- (4) A regional authority must complete a review of a policy within 5 years after the policy is adopted and then at intervals of not more than 5 years.
- (5) A policy does not cease to have effect because it is due for review or being reviewed.

177. Application for determination

A party may apply to the chief executive for a determination in relation to 1 or more of the following matters:

- (a) whether particular matters comply with the building code:
- (b) a building consent authority's decision to—
 - (i) issue, or refuse to issue, a building consent, code compliance certificate, or compliance schedule; or
 - (ii) refuse to allow, under section 52(b), an extension of the period during which building work must be commenced before a building consent lapses; or
 - (iii) issue a notice to fix; or
 - (iv) refuse to allow, under section 93(2)(b)(ii), an extension of the period during which the building consent authority must decide whether or not to issue a code compliance certificate; or
 - (v) amend a building consent, notice to fix, or code compliance certificate; or
 - (vi) impose a condition on a notice to fix or compliance schedule or to amend that condition:
- (c) a territorial authority's decision to—

- (i) grant or refuse a waiver or modification of the building code under section 67; or
 - (ii) issue, or refuse to issue, a certificate of acceptance under section 96; or
 - (iii) amend a compliance schedule under section 106 or section 107; or
 - (iiia) issue or refuse to issue a certificate for public use under section 363A; or
 - (iv) issue, amend, or impose a condition on a notice to fix:
- (d) the exercise by a territorial authority of its powers under sections 112 and 115 to 116 (which relate to alterations to, or changes in the use of, a building) and the issue by a territorial authority of a certificate under section 224(f) of the Resource Management Act 1991:
 - (e) the exercise by a territorial authority of its powers under section 124 or section 129 (which relate to dangerous, earthquake-prone, and unsanitary buildings) or the failure to exercise those powers:
 - (f) the exercise by a regional authority of its powers under subpart 5 of Part 2 in relation to a dam or the failure to exercise those powers.

APPENDIX 2 – Building (Dam Safety) Regulations 2008

1 Title

These regulations are the Building (Dam Safety) Regulations 2008.

2 Commencement

These regulations come into force on 1 July 2012.

3 Interpretation

- (1) In these regulations, unless the context otherwise requires,—

Act means the Building Act 2004

Competency Assessment Board means the Competency Assessment Board appointed under Part 5 of the Chartered Professional Engineers of New Zealand Rules (No 2) 2002

population at risk means the number of people likely to be affected by inundation greater than 0.5 metres in depth

specified categories are residential infrastructure, critical or major infrastructure (both damage caused and time to restore to operation), natural environment, and community recovery time.

- (2) Terms or expressions used and not defined in these regulations but defined in the Act have, in these regulations, the same meanings as they have in the Act.

4 Dam classification

A dam classification is to be determined by undertaking the following steps:

- (a) identify the effect that an uncontrolled release of the reservoir due to a failure of the dam when full would have on each of the specified categories; and
- (b) use table 1 of Schedule 1 to determine the assessed damage level by assessing whether the damage level in each of the specified categories is catastrophic, major, moderate, or minimal then selecting the highest damage level; and
- (c) estimate the population at risk; and
- (d) use table 2 of Schedule 1 to determine the dam classification by correlating the assessed damage level with the estimated population at risk.

5 Competencies for category A recognised engineers

- (1) A category A recognised engineer is an engineer who meets the requirements set out in section 149(1)(a) and (b) of the Act and is assessed by the Competency Assessment Board as demonstrating that he or she is able to practise competently in the area of dam safety engineering to the reasonable standard of a professional engineer practising in that area.
- (2) The extent to which the person has experience and knowledge in any or all of the following things must be taken into account when assessing whether that person meets the standard in subclause (1):
 - (a) geotechnical principles:
 - (b) design principles including structural geotechnical seismic hydrologic and hydraulic principles:
 - (c) dam construction techniques:
 - (d) operation and maintenance of dams:
 - (e) surveillance processes:
 - (f) response to dam safety issues:
 - (g) emergency planning:
 - (h) emergency response:
 - (i) resolution of potential dam safety deficiencies:
 - (j) dam safety critical plant systems.

6 Competencies for category B recognised engineers

A category B recognised engineer is an engineer who meets the requirements set out in section 149(1)(a) and (b) of the Act and who has general civil engineering ability and experience.

7 Audit of dam classification and audit and review of dam safety assurance programme by recognised engineers

- (1) A category A recognised engineer may, in relation to any dam, issue the following certificates:
 - (a) following a dam classification audit, a dam classification certificate in form 1 of Schedule 2:
 - (b) following a dam safety assurance programme audit, a certificate in form 2 of Schedule 2:

- (c) following a review of a dam safety assurance programme carried out under section 150 of the Act, a certificate in form 3 of Schedule 2.
- (2) A category B recognised engineer may, in relation only to a low potential impact dam, issue a dam classification certificate in form 1 of Schedule 2 following a dam classification audit.

8 Criteria and standards for dam safety assurance programme

- (1) This regulation sets out the criteria and standards for dam safety that a dam safety assurance programme must meet.
- (2) A dam safety assurance programme must—
 - (a) be consistent with the dam safety management principles related to operation, maintenance, surveillance, and emergency action planning as provided in the *New Zealand Dam Safety Guidelines* (published by the New Zealand Society on Large Dams, November 2000); and
 - (b) be appropriate to the type and size of the dam and the dam classification given to the dam under regulation 4.
- (3) Every dam safety assurance programme must contain the following:
 - (a) requirements for and frequency of surveillance, routine visual inspections, instrument monitoring, data evaluation, and reporting to the dam owner:
 - (b) requirements for annual dam safety reviews:
 - (c) requirements for comprehensive dam safety reviews:
 - (d) details of an emergency action plan:
 - (e) requirements for inspection of appurtenant structures, including testing of gates and valves that contribute to reservoir safety:
 - (f) procedures for the investigation, assessment, and resolution of dam safety deficiencies.

9 Dam classification certificate

A dam classification certificate must—

- (a) be in form 1 of Schedule 2; and
- (b) contain the information requested in the form.

10 Dam safety assurance programme

A dam safety assurance programme must—

- (a) be in form 2 of Schedule 2; and
- (b) contain the information requested in the form and include any documentation required to be attached.

11 Annual dam compliance certificate

An annual dam compliance certificate must—

- (a) be in form 3 of Schedule 2; and
- (b) contain the information requested in the form.

Schedule 1 Dam classification

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Table 1—Determination of assessed damage level

Damage level	Specified categories				Community recovery time
	Residential houses ¹	Critical or major infrastructure ²	Natural environment		
		<i>Damage</i>	<i>Time to restore to operation³</i>		
Catastrophic	More than 50 houses destroyed	Extensive and widespread destruction of and damage to several major infrastructure components	More than 1 year	Extensive and widespread damage	Many years
Major	4 to 49 houses destroyed and a number of houses damaged	Extensive destruction of and damage to more than 1 major infrastructure component	Up to 12 months	Heavy damage and costly restoration	Years
Moderate	1 to 3 houses	Significant damage to	Up to 3	Significant but	Months

Damage level	Specified categories				Community recovery time
	Residential houses ¹	Critical or major infrastructure ²	Natural environment		
		<i>Damage</i>	<i>Time to restore to operation³</i>		
	destroyed and some damaged	at least 1 major infrastructure component	months	recoverable damage	
Minimal	Minor damage	Minor damage to major infrastructure components	Up to 1 week	Short-term damage	Days to weeks

Notes

- 1 In relation to residential houses, destroyed means rendered uninhabitable. Includes—
- (a) lifelines (power supply, water supply, gas supply, transportations systems, wastewater treatment, telecommunications (network mains and nodes rather than local connections)); and
- 2
- (b) emergency facilities (hospitals, police, fire services); and
 - (c) large industrial, commercial, or community facilities, the loss of which would have a significant impact on the community; and
 - (d) the dam, if the service the dam provides is critical to the community and that service cannot be provided by alternative means.
- 3 The estimated time required to repair the damage sufficiently to return the critical or major infrastructure to normal operation.

Table 2—Determination of dam classification

Assessed damage level	Population at risk (PAR)			
	0	1 to 10	11 to 100	More than 100
Catastrophic	High potential impact	High	High	High
Major	Medium potential impact	Medium/High (see note 4)	High	High
Moderate	Low potential impact	Low/Medium/High (see notes 3 and 4)	Medium/High (see note 4)	Medium/High (see notes 2 and 4)
Minimal	Low potential impact	Low/Medium/High (see notes 1, 3, and 4)	Low/Medium/High (see notes 1, 3, and 4)	Low/Medium/High (see notes 1, 3, and 4)

Notes

- 1 With a PAR of 5 or more people, it is unlikely that the potential impact will be low.
- 2 With a PAR of more than 100 people, it is unlikely that the potential impact will be medium.
- 3 Use a medium classification if it is highly likely that a life will be lost.
- 4 Use a high classification if it is highly likely that 2 or more lives will be lost.