

BUILDING PERFORMANCE



Summary of submissions on the proposed regulatory framework for dam safety

OCTOBER 2019



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Definition of terms used in this document

The following terms are used in this document:

Term	Meaning
AEP	Annual exceedance probability. The annual probability that an event of a given magnitude will occur.
Appurtenant structure	In relation to a dam, means a structure that is not part of the dam itself but performs a function that is integral to the safe functioning of the dam, such as a spillway.
CDEM	Civil Defence Emergency Management Act 2002. The acronym is used to describe an organisation that performs duties mandated by the Act.
Consequence of failure	The downstream and upstream effects that would result from a failure of the dam or its appurtenant structures.
Classifiable dam	“Classifiable dam” is defined in the Building Act 2004 as a dam that meets the height and volume thresholds for regulation under the Act, and by regulations made under the Act. The height and volume thresholds must be defined by regulations.
Crest	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— <ul style="list-style-type: none"> (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; and (b) includes— <ul style="list-style-type: none"> (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
Dam height	The vertical distance from the crest of the dam and must be measured— <ul style="list-style-type: none"> (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.

Term	Meaning
Dam safety assurance plan (DSAP)	The dam owner’s dam safety management plans and procedures designed to ensure that the economic, environmental and public safety potential impacts posed by a dam are appropriately managed. The DSAP in the proposed regulatory framework contains seven elements.
Dam safety incident	An event that develops naturally or unexpectedly, but does not pose an imminent threat to the integrity of the dam or downstream property or life.
Emergency	A situation that poses an immediate risk to life, health, property, or the environment, and requires a coordinated response.
Engineering New Zealand	Association of professional engineers in New Zealand. Performs the occupational regulation for professional engineers.
Failure	In terms of structural integrity, the uncontrolled release of the contents of a reservoir through failure of a dam or appurtenant structure. In terms of performance to fulfil its intended function, the inability of a dam or appurtenant structure to perform functions such as water supply, prevention of excessive seepage or containment of hazardous substances.
Freeboard	The vertical distance between the still water surface elevation in the reservoir and the lowest elevation of the top of the dam or other containment structure.
NZSOLD	New Zealand Society of Large Dams. A technical group of Engineering New Zealand. Representative body of dam engineers. Author of the New Zealand Dam Safety Guidelines, which provide best practice guidance for the safe design, construction, operation, management and rehabilitation of dams in NZ.
Potential impact classification (PIC)	A system of classifying dams according to the incremental consequences of dam failure, so that appropriate dam safety criteria can be applied. In classifying a dam, the owner must— (a) apply the prescribed criteria and standards for dam safety; and (b) give the dam one of the following classifications: (i) low potential impact; or (ii) medium potential impact; or (iii) high potential impact; and (c) submit the classification of the dam to a Recognised Engineer for audit.
Recognised engineer	A Recognised Engineer is defined in the Building Act 2004 as an engineer who is registered under the Chartered Professional Engineers of New Zealand Act 2002 who has both the prescribed qualifications and the prescribed competencies.
Referable dam	Defined in the Building Act as a category of dam below the threshold for “classifiable dam”. The threshold for “referable dam” must be defined by regulations. It is not proposed to define referable dam at this time.
Reservoir	The body of water, fluid waste or tailings that is impounded by a dam.

Submissions at a glance

In July and August 2019, MBIE consulted the public on a proposed regulatory framework for dam safety: <https://www.mbie.govt.nz/dmsdocument/5731-proposed-regulatory-framework-for-dam-safety>

Submissions were received from a wide range of dam sector stakeholders. In total, 106 submissions were received.

What dams are included in the regulatory framework?

There was considerable comment received on the height and volume thresholds for inclusion in the dam safety regulatory system. The greatest disagreement related to the proposed 30,000 cubic metre volume threshold, which has no minimum height.

Many owners of small to medium dams considered that the proposed regulations represent a heavy handed approach to the risks their dams pose. They suggested increases to the thresholds that had the effect of excluding their dams from the regulatory system.

Irrigation dams are frequently constructed using a “turkey nest” design. Excavated material from the centre of the reservoir is used to construct a dam around the circumference of the reservoir. This forms a water storage reservoir that is partially below ground level. Questions were raised by the owners of these dams as to how their volume should be measured.

Other small to medium dams include water supply dams, sewage treatment dams and flood detention dams. Flood detention dams are empty of water for the majority of the time. A number of the local authority owners of these dams were concerned about their inclusion and sought partial or full exclusion from the regulatory framework.

Compliance costs

A variety of views were expressed about regulatory compliance costs. In general, dam owners who are already following the New Zealand Dam Safety Guidelines were less concerned about compliance costs. Other dam owners expressed much stronger concerns.

Most large commercial dam owners follow the New Zealand Dam Safety Guidelines and have the asset management and information management systems in place to be able to comply with the proposed regulations. These dam owners were supportive of the need to regulate dam safety and were largely unconcerned about compliance cost.

City and district councils are significant dam owners. These dams include water supply dams, sewage treatment dams and flood detention dams. With some exceptions, councils do not follow the New Zealand Dam Safety Guidelines. Submissions from city and district councils raised concerns about the scale of the compliance costs to implement dam safety management systems for their dams. Many also commented that investment would be required to raise the resilience of their dams if the proposed regulations are brought into force.

Owners of irrigation dams (largely farmers) were concerned about regulatory compliance costs and stated that the proposed regulations have the potential to make irrigation dams uneconomic to construct or to operate.

Recognised engineer

The majority of submitters thought that the list of engineering competencies in the discussion document lacked sufficient detail. Others suggested that the identified competencies were focussed on the wrong skills. It was recommended by most submitters that MBIE and Engineering New Zealand work together to refine the competencies.

Concern was expressed by many submitters that a lack of suitably trained and qualified engineers has the potential to be a bottleneck for implementation of the regulations. For many submitters this was a reason for adopting a longer implementation timeframe than the one proposed in the discussion document.

Understanding and assessing risk

A number of submitters thought that the approach to risk described in the discussion document was too narrow. An Iwi submitter commented on the need for cultural values to form part of a dam failure impact assessment. Other submitters commented on the need for the inclusion of social well-being measures such as the presence of vulnerable populations within a dam's inundation zone.

Civil defence and emergency management (CDEM) organisations emphasised the need for emergency sector and wider community engagement when developing dam emergency response plans.

New Zealand Dam Safety Guidelines

A key concern voiced by large dam owners was overlap and duplication between the proposed regulations and the New Zealand Dam Safety Guidelines. These dam owners had considerable investment in dam safety management systems and wanted reassurance that being compliant with the Guidelines would mean that they were also compliant with the regulations.

Electricity generators manage their dams within the context of whole power schemes. These may include multiple dams linked by canals. The New Zealand Dam Safety Guidelines provide for dam safety management systems that are scheme wide. Some of these dam owners expressed concerns that the proposed regulatory framework has been designed for single dams and does not provide for scheme-wide safety systems. This may create fragmentation and duplication in dam safety management systems, making these systems less effective and less efficient.

Earthquake prone, flood prone and dangerous dams

Some submitters expressed concerns about the proposed thresholds for earthquake prone, flood prone and dangerous dams as these thresholds differ from those in the New Zealand Dam Safety Guidelines (the proposals are less stringent). Large dam owners were concerned about the potential to undermine the Guidelines over time where the proposed regulations set safety standards that differ from the Guidelines.

A number of technical comments were made about how the thresholds are measured. The earthquake thresholds attracted the most comments, with requests for alignment between the dam safety earthquake thresholds and those in the Building Code.

Compliance systems and processes

A number of comments were made about the compliance requirements for the proposed regulations. These included unnecessary duplication of information between forms and review frequencies being too high.

An important concern for many dam owners was the requirement to display a copy of the dam's annual compliance certificate on the dam itself. Most dams do not have an enclosed space or structure on which to fix a certificate and many owners found this requirement excessively bureaucratic.

Overview of submissions

<p>Recognised engineer</p>	<p>Responses were received from 65 submitters for the question “do you agree with the qualification requirements for a recognised engineer?” Of these, 54 agreed. A number of the submitters that disagreed raised concerns that the requirements had the potential to increase compliance costs and were unnecessarily restrictive for regulation of smaller dams.</p> <p>There were 63 submitters who responded to the question “do you agree with the proposed competencies for a recognised engineer?” More submitters disagreed (41) than agreed (22).</p> <p>The recognised engineer competencies attracted the greatest number of comments. Concerns raised included that the engineering skill requirements were not well enough specified and that capability constraints had the potential to delay compliance with the regulations. Most submitters wanted MBIE to work with Engineering NZ to refine the skill requirements and develop a register for recognised engineers.</p>
<p>Timeframe</p>	<p>The majority (37) of the 59 submitters who answered disagreed with the question “the proposed timeframe for regulations to come into force is 12 months after they are gazetted. Do you think this timeframe is adequate?”</p> <p>The most common concern raised was that the industry does not have the capacity to complete the required potential impact classifications (PICs) and dam safety assurance plans (DSAPs) within this timeframe. A majority of submitters preferred a timeframe of 24 months or more.</p>
<p>Classifiable dam</p>	<p>Of the 74 responses to the question “do you agree with the proposed classification threshold to determine if a dam is a classifiable dam?” a majority (42) disagreed.</p> <p>Most submitters supported the proposal that dams exceeding 4 metres in height and 20,000 cubic metres in volume should be regulated. Supporters included Federated Farmers and many from the farming community. However, many submitters did not agree with the proposal to include a 30,000 cubic metre threshold without a height limit.</p>
<p>Referable dam</p>	<p>There were 62 responses to the question “do you agree that it is unnecessary to have a separate category for referable dams (considering the proposed classification threshold and regional authorities’ powers under section 157 of the Building Act)?” A majority of submitters (34) agreed, however, the number who disagreed (28) was high.</p> <p>Owners of irrigation dams proposed keeping this category for farm dams, combined with higher height and volume thresholds for classifiable dams.</p>
<p>Potential impact classification</p>	<p>There were 64 answers to the question “do you agree with the proposed Potential Impact Classification system in step 2?” Of these, the majority (39) agreed with the proposals.</p> <p>Submitters were generally supportive of the PIC as an approach to assessing risk. Although, many owners of smaller farm dams saw the PIC requirement as an unnecessarily heavy-handed approach to regulating their dams.</p>

<p>Dam safety assurance plan (DSAP)</p>	<p>Of the 40 submitters who answered the question “do you agree with the proposed elements of a Dam Safety Assurance Programme?” more than three quarters (31) agreed.</p> <p>Larger dam owners using the NZSOLD New Zealand Dam Safety Guidelines noted that the DSAP proposals set a lower standard than is provided by the Guidelines. Farmers and irrigators tended to express the view that the DSAP requirements were unnecessarily onerous for their irrigation dams.</p>
<p>Earthquake prone, flood prone and dangerous dam:</p> <p><i>Moderate earthquake</i></p> <p><i>Moderate flood</i></p> <p><i>Earthquake threshold event</i></p> <p><i>Flood threshold event</i></p> <p><i>Dangerous dam</i></p>	<p>The number of submitters who answered one or more questions relating to earthquake prone, flood prone or dangerous dams was only 40 of the 106 total submissions. Of those that answered, the majority of submitters supported all the definitions.</p> <p>Dam owners currently using the NZSOLD New Zealand Dam Safety Guidelines mostly commented that the proposed earthquake and flood thresholds have annual exceedance probabilities (AEP) that are lower than those used in the Guidelines.</p> <p>Other submitters raised technical issues about how the definitions were interpreted or about how they applied to their dams.</p>
<p>Other</p> <p><i>Information requirements</i></p> <p><i>Dam classification certificate</i></p> <p><i>Annual dam compliance certificate</i></p> <p><i>Costs and benefits</i></p> <p><i>NZSOLD dam safety guidelines</i></p>	<p>In total, 62 submitters answered one or more questions about the information and certification requirements for the proposed regulations. Of these submissions 52 supported the proposals “in part”. Of the remaining 10 submitters, 7 fully supported the proposals, while 3 did not.</p> <p>Few comments were made about the proposed information or certification requirements. The most frequently expressed concern was about the requirement to display a copy of the Dam Compliance Certificate on the dam. Most preferred the provision of online dam information.</p> <p>A small number of submitters provided information about compliance costs for the proposed regulations. Dam owners who are not currently following the NZSOLD New Zealand Dam Safety Guidelines may face significant costs to comply with the new regulations. Costs are not expected to be high for dam owners who are currently following the Guidelines.</p>
<p>Matters not within scope</p>	<p>Some of the submissions proposed changes that would require amendments to the Building Act. Amendments to the Building Act are not within the project scope. The concerns of submitters will be addressed through the design of the regulations.</p>

Why has MBIE proposed a regulatory framework for dam safety?

A framework for dam safety is set out in the Building Act, but regulations are needed to give full effect to this framework. The lack of a full dam safety framework is undesirable for a number of reasons:

- › **Risk to downstream people, property and the environment:** the regulatory framework does not specify the safety-related activities that owners should carry out. A lack of monitoring, or loose monitoring processes, and/or deferring maintenance can create the potential for dam failure.
- › **Lack of certainty and difficulties for owners of dams to ascertain obligations:** there is a lack of certainty about what ongoing safety-related assurance activities owners of dams are required to carry out.
- › **Inconsistencies in compliance conditions across dams:** in the absence of specific dam safety regulations, some regional authorities use conditions on resource consents as a way to manage dam safety. This practice can mean that dams posing the same level of risk are facing different dam safety requirements. Older consents may have fewer conditions relating to dam safety, while newer consents tend to have more detailed conditions. Some of the more recent resource consent conditions refer to the NZSOLD New Zealand Dam Safety Guidelines (2015). This inconsistency can be confusing for operators who are responsible for more than one dam, other participants in the resource consent process, and authorities who manage these processes.
- › **Lack of reporting requirements:** the Building Act requires regional authorities to keep a register of dams in their region. However, regulations are needed to give effect to the parallel requirement for owners of dams to provide regional authorities with their dams' potential impact classifications and dam safety assurance programmes.
- › **Enforcement challenges:** conditions that vary across similar dams, or that are loosely specified e.g. "compliance with the New Zealand Dam Safety Guidelines (2015)" may be difficult to enforce.

The regulations propose to establish a nationally consistent approach that will protect people, property and the environment from the potential impact of a large dam's failure without imposing undue compliance costs.

The regulations will bring New Zealand into line with the majority of OECD countries that already have dam safety schemes in place.

Review and engagement approach

MBIE published a public discussion document outlining a set of proposals for a new regulatory framework on 11 June 2019. The proposals aim to establish a nationally consistent approach to dam safety under the Building Act 2004 that better manages the potential risks of dams without imposing undue compliance costs.

The proposed regulatory framework was developed with the assistance of a panel of dam safety experts and aims to provide better assurance that dams are being managed appropriately. It will also improve information collection about the number, size, location and ownership of all classifiable dams in New Zealand.

In addition, MBIE has analysed the dam safety schemes of a number of other countries and will be completing a cost benefit analysis of the proposed regulatory approach.

Submissions on the discussion paper closed on 6 August 2019; a total of 106 submissions were received.

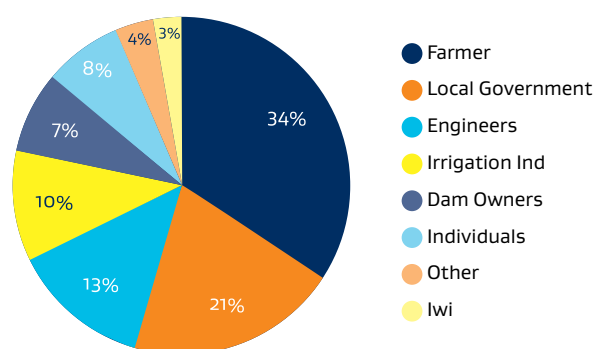
Who provided feedback on the proposals?

In July and August 2019, MBIE consulted the public on a proposed regulatory framework for dam safety. In total, 106 unique submissions were received.

Table 1: Submitters by category

Farmers or farmer representative bodies	36
Local government (dam owners and regulators)	22
Engineers (individuals and companies)	14
Irrigation industry (non-farmers)	11
Large dam owners including electricity and mining. Excludes local government and irrigation industry	8
Individual submitters (non-farmer and non-engineer)	8
Other interest groups	4
Iwi organisations	3
Total	106

Figure 1: Submitters by proportion of total



With the inclusion of farmers and local government, a majority of the submitters owned dams. The remaining submitters were largely involved in dam construction, maintenance, monitoring, safety reviews and/or regulation. Local government

submitters included some that managed dams and others that regulated dams. In a few cases multiple submissions with differing perspectives were received from the same local authority. Auckland local government bodies made three separate submissions.

The largest number of submissions came from the rural sector, with owners and operators of irrigation dams making up most of these.

In general, larger dam owners manage their dams under the NZSOLD New Zealand Dam Safety Guidelines. Smaller dam owners largely do not use the Guidelines. Some dams are subject to resource consents which require dam owners to adhere to the Guidelines.

The feedback received on proposals

This section summarises the submissions received in response to the proposals in the discussion document.

Proposed recognised engineer requirements

The recognised engineer requirements determine the qualifications and skills for engineers who perform regulatory functions under the proposed dam safety regulations.

What was proposed

The Building Act 2004 specifies the following roles for recognised engineers:

Audit and certify the potential impact classification of a dam
Audit and certify the DSAP
Certify compliance with the approved DSAP
Certify reviews of the classification of a dam
Certify reviews of the DSAP

The Building Act's requirements for the involvement of recognised engineers are intended to ensure a dam has the correct potential impact classification and that a DSAP meets the prescribed criteria and standards for dam safety.

Owners of dams would need to engage a recognised engineer to certify their PIC and their DSAP. The proposed regulations would specify the competencies that the recognised engineers must be able to demonstrate.

Under the Building Act, a 'recognised engineer' is an engineer who:

Has no financial interest in the dam concerned
Is registered under the Chartered Professional Engineers of New Zealand Act 2002
Has: <ul style="list-style-type: none"> > the prescribed qualifications; and > the prescribed competencies

Proposed prescribed qualifications

It was proposed in the consultation document that the qualification requirement is met by the existing requirement for a registered engineer to be registered under the Chartered Professional Engineers of New Zealand Act 2002 (or any future statutory equivalent). This legislation requires an engineering qualification from an accredited programme recognised under the Washington Accord.

Proposed prescribed competencies

The consultation document proposed that a recognised engineer be required to demonstrate all or some of the following competencies:

Geotechnical principles
Design principles including structural, geotechnical, seismic, hydrologic and hydraulic principles
Dam construction techniques
Operation and maintenance of dams
Surveillance processes
Response to dam safety issues
Emergency planning and emergency response
Resolution of potential dam safety deficiencies
Dam safety critical plant systems

It was proposed that Engineering New Zealand should develop and oversee an assessment process to determine whether an engineer fulfils the proposed competency requirements to be a recognised engineer.

What submitters said

Most submitters agreed with the required qualifications for a “recognised engineer”.

However, submitters were less happy with how the competency requirements for a recognised engineer were specified.

Figure 2: Qualifications for recognised engineer

Do you agree with the proposed qualification requirements for a “Recognised Engineer”?

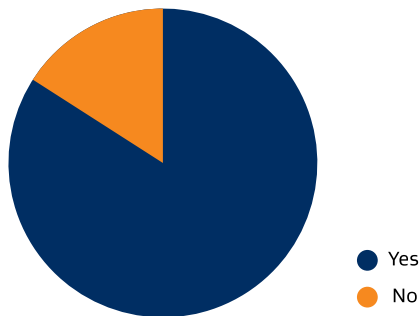
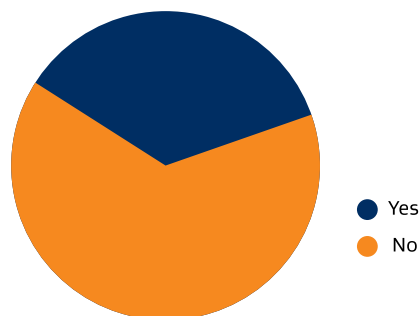


Figure 3: Competency requirements for recognised engineer

Do you agree with the proposed competencies for a “Recognised Engineer”?



There were 65 responses to the question “do you agree with the qualification requirements for a recognised engineer?”

Of these, 54 agreed with the requirements. Of the submitters who disagreed, a number expressed the view that the requirements had the potential to increase compliance costs and were unnecessarily restrictive for regulation of smaller dams.

More submitters disagreed (41) than agreed (22) with the question “do you agree with the proposed competencies for a recognised engineer?”

The recognised engineer requirements attracted the greatest number of comments. Many dam owners and regional authorities were concerned that engineering capability constraints could delay compliance with the regulations. Smaller dam owners saw the requirements as adding unnecessary compliance costs and wanted professionals with lower technical skills to be able to certify smaller dams.

Several submissions commented that the engineering skills required to assess and certify a dam’s safety assurance plan differ from the structural engineering skills required build a dam. These submitters proposed developing a scope of practice for dam safety engineers that is distinct from that for dam design engineers.

A submitter who is a dam engineer stated that floods are a common cause of dam failure and that knowledge of hydrology is a key competency for dam safety engineers. This submission proposed that hydrology be added to the list of competencies.

Many submitters thought that all of the competencies specified in the discussion document were required and that the words “all or some” in the discussion document weakened the professional requirements.

The majority of submitters wanted MBIE to work with Engineering New Zealand to further develop the skill requirements and a register for dam safety engineers.

Proposed timeframe

What was proposed

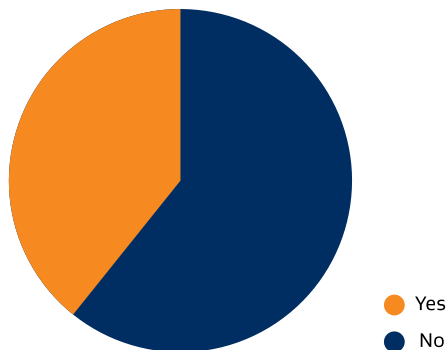
MBIE proposed that the regulations come into force 12 months from the date they are gazetted.

What submitters said

Most submitters disagreed with the 12 month implementation timeframe for the proposed regulations. Dam owners who were following the NZSOLD Dam Safety Guidelines tended to express less concerns.

Figure 4:

The proposed timeframe for regulations to come into force is 12 months after they are gazetted. Do you think this timeframe is adequate?



The majority (37) of 59 submitters disagreed with the question “the proposed timeframe for regulations to come into force is 12 months after they are gazetted. Do you think this is adequate?”

The most common concern raised was that the industry does not have the capacity to complete the required potential impact classifications and dam safety assurance plans within this timeframe. Most submitters preferred a timeframe of 24 months or more.

A number of submitters thought it was important to finalise the requirements for recognised engineers and to establish a register of recognised engineers before finalising the implementation date. These submitters considered that it would not be possible to implement the regulations until adequate engineering capability was in place.

Classifiable dam

The classifiable dam threshold determines whether a dam requires a potential impact assessment. Dams that fall below this threshold will not require further action under the dam safety regulations.

What was proposed

MBIE proposed that a classifiable dam is a dam that meets or exceeds the following classification thresholds:

Meets the Building Act’s definition of a ‘large dam’ (a height of 4 or more metres and holds 20,000 or more cubic metres volume of water or other fluid); **OR**

Holds 30,000 or more cubic metres volume of water or other fluid (no minimum height)

What submitters said

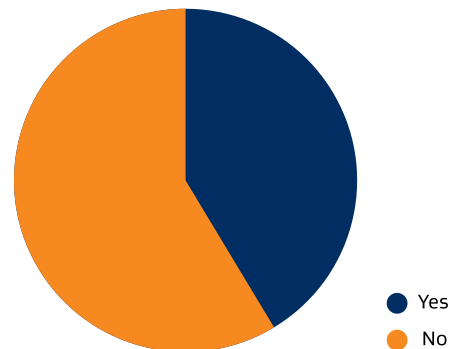
There were 74 responses to the question “do you agree with the proposed classification threshold to determine if a dam is a classifiable dam?” The majority (42) disagreed.

When comments were analysed it was apparent that a high proportion of the objections related to the 30,000 cubic metre volume threshold without an associated height.

Most submitters supported the proposal that dams exceeding 4 meters in height and 20,000 cubic meters in volume should be regulated. Supporters included Federated Farmers and many from the farming community.

Figure 5: Classifiable dam

Do you agree with the proposed classification threshold to determine if a dam is a classifiable dam?



Submissions that opposed a 30,000 volume threshold without a minimum height came from district councils, farmer/irrigators and the Canterbury and Otago Fish and Game Council.

A number of submitters discussed the structures that would be captured by the 30,000 threshold without a minimum height. These included sewage treatment ponds, flood detention dams, irrigation ponds and wetland weirs. Proposed minimum height limits for the 30,000 volume threshold ranged from 0.5 – 2.0 metres.

Some submitters considered that dam owners should not be responsible for identifying whether their dams are classifiable, and that an independent person should undertake these measurements.

A number of submitters considered that the risks associated with canals differ from the risks associated with dams and expressed concerns that insufficient thought had been given to how the proposed thresholds would work for canals. They proposed that MBIE undertake further work on the regulatory requirements for canals.

Referable dam

What was proposed

MBIE proposed not to define ‘referable dam’ at this stage. MBIE is of the view that the classification threshold is sufficient to capture dams that present hazard to people, property and the environment.

In a previous consultation on a dam safety scheme, MBIE proposed the following definition for referable dam:

Has a height of 4 or more metres or holds 20,000 or more cubic metres volume of water or other fluid and is not a classifiable dam

The previous consultation also proposed a much higher threshold for the classifiable dam classification than has been proposed in the present consultation.

Proposing a higher threshold for a classifiable dam meant some smaller dams that potentially posed hazard were not captured. In this situation the category of ‘referable dam’ was useful to capture those smaller dams that may have still posed hazard. Those smaller dams are now captured under the proposed classification threshold for classifiable dams, so the referable dam category is no longer needed.

What submitters said

There were 62 submitters who answered the question “do you agree that it is unnecessary to have

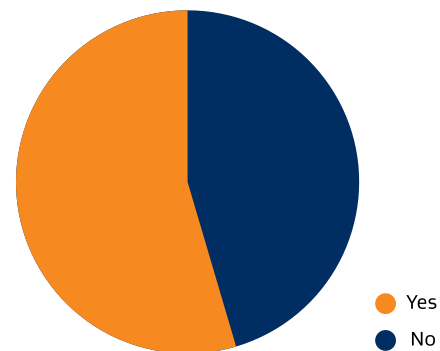
a separate category for referable dams (considering the proposed classification threshold and regional authorities’ powers under section 157 of the Building Act)?”

Most submitters supported removing the category “referable dam” from the regulatory framework. However, many owners of on-farm irrigation dams proposed retaining this category for farm dams, combined with higher height and volume thresholds for classifiable dams. This was seen as enabling a more light-handed regulatory approach to farm dams.

One local government submitter thought that the referable dam category should be retained for very small dams because in some circumstances even these dams can be hazardous.

Figure 6: Referable dam

Do you agree that it is unnecessary to have a separate category for referable dams (considering the proposed classification threshold and regional authorities’ powers under section 157 of the Building Act)?



Potential impact classification (PIC)

The PIC is an important component of the proposed regulatory framework. Dams that are defined as “classifiable” based on their height and volume would have the impacts of a hypothetical dam failure assessed.

What was proposed

Under the proposed regulatory framework, dams would receive a high, medium or low PIC classification, based on the potential consequences of a dam failure on people, property and the environment. The proposed PIC assessment mirrors the assessment methodology in the New Zealand Dam Safety Guidelines.

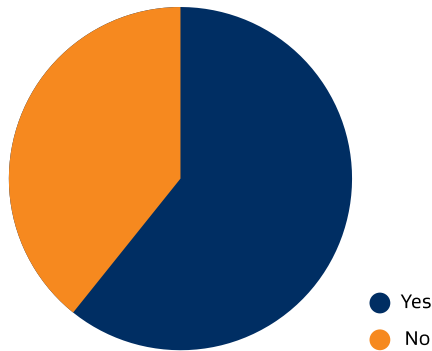
This assessment must be certified by a recognised engineer who states that the classification of the dam meets the prescribed criteria and standards for dam safety.

What submitters said

Most submitters agreed with the potential impact classification proposals, but a significant number disagreed.

Figure 7: Potential Impact Classification

Do you agree with the proposed Potential Impact Classification system in step 2?



There were 64 submitters who answered the question “do you agree with the proposed Potential Impact Classification system in step 2?” Of these, the majority (39) agreed with the proposals.

Submitters were generally supportive of the PIC as an approach to assessing hazard. Although, some owners of smaller farm dams saw the PIC requirement as an unnecessarily heavy-handed approach to regulating their dams.

Some larger dam owners suggested there should be an option for dam owners to self-classify as high PIC under the regulations, especially where a PIC assessment has already been undertaken as part of the owner’s implementation of the New Zealand Dam Safety Guidelines 2015. This would mean that these dams would not need to be reassessed as part of complying with the new regulations. However, within the High PIC classification potential impacts may still change with time and these changes should be reflected in the owner’s emergency preparedness and response plans.

A number of suggestions for improvement to the PIC were made. Some thought that number of houses was an inadequate measure of economic and social risk and other buildings or investments should be included. Other submitters suggested that the presence of vulnerable populations such as schools and rest homes within the inundation zone of a dam should be a factor in its PIC classification. One submission stated that cultural values need to be reflected in our understanding of hazard. Some submitters commented that a PIC should be reassessed if significant development occurs in the floodplain of a dam.

Many submitters considered that detailed guidance needs to be provided to the dam sector on the scope of a PIC and the methodology for developing one. Some submitters suggested that this guidance could be based on the material in the New Zealand Dam Safety Guidelines 2015.

Dam safety assurance plan (DSAP)

The purpose of the DSAP requirement is to ensure that dam owners actively manage the risks that their dams present to the public and to the environment.

What was proposed

MBIE proposed that owners of medium and high PIC dams must prepare and submit a DSAP to the relevant regional authority. Low PIC dams would not be required to prepare a DSAP.

The requirement for a DSAP would compel owners of dams to plan for and commit to the safe operation of their dam and provide processes for the overall management of dam safety.

It was proposed that the DSAP must be audited and certified by a Recognised Engineer. The onus would be on the owners of dams to ensure the information provided to the regional authority meets the prescribed criteria and standards for dam safety.

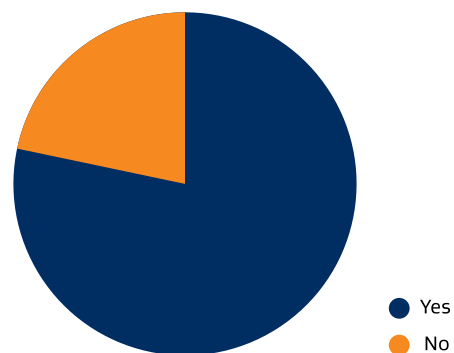
A DSAP must be consistent with the dam safety management principles provided in the New Zealand Dam Safety Guidelines for a DSAP and be appropriate for the type and size of the dam and the dam classification.

What submitters said

The number of submitters who answered the question “do you agree with the proposed elements of a dam safety assurance programme?” was 40. Of these, more than three quarters (31) agreed.

Figure 8: Dam safety assurance programme

Do you agree with the proposed elements of a Dam Safety Assurance Programme?



Submissions largely supported the need for a DSAP where a dam was identified as high or medium PIC. However, views differed about what a DSAP should contain.

The majority of larger dam owners manage their dams under the New Zealand Dam Safety Guidelines and many of them noted that the DSAP proposals set a lower standard than is provided by the Guidelines. The concern was expressed that this had the potential to lower the standard of dam safety practice across the industry.

Some dam owners who were not following the Guidelines saw the DSAP proposals as adding cost and administrative complexity to their dam management. One local authority that owns a number of dams not currently being managed under the Guidelines raised concerns that it faces a substantial cost in physical works to its dams to meet the new regulatory requirements.

Some submitters suggested that annual compliance certification should be less frequent. Some submitters thought that a DSAP should only need to be reviewed where there is a change to the PIC of a dam.

Many owners of irrigation dams expressed the view that the DSAP requirements were unnecessarily onerous for their dams. These dam owners tended to argue for lower regulatory standards for irrigation dams.

Submissions from CDEM organisations, and one from an Iwi organisation, expressed the view that DSAPs need to incorporate community engagement, especially where the impact of a dam failure would have serious consequences for social well-being. These submissions argued that the civil defence and emergency management provisions in the DSAP need to be strengthened and that there should be an emphasis on the role of the dam owner as first respondent in an emergency.

Earthquake prone, flood prone and dangerous dams

What was proposed

The Building Act 2004 defines dangerous, earthquake-prone and flood-prone dams as high or medium PIC dams that are likely to fail under certain circumstances:

dangerous dam	in the ordinary course of events or in a 'moderate earthquake' or a 'moderate flood'
earthquake-prone dam	in an 'earthquake threshold event'
flood-prone dam	in a 'flood threshold event'

The terms "moderate earthquake", "moderate flood", "earthquake threshold event" and "flood threshold event" need to be defined in the regulations.

The discussion document proposed that the dam safety regulations include the following definitions:

Moderate earthquake	An earthquake that would generate shaking at the site of the dam that would occur with a 1 in 50 annual exceedance probability (determined by normal measures of acceleration, velocity, and displacement) but not less than shaking determined using a z factor of 0.13.
Moderate flood	A flood of water or other fluid flowing into the reservoir that has a 1 in 50 annual exceedance probability.
Earthquake threshold event	<ul style="list-style-type: none"> › For a high potential impact dam, an earthquake that would generate shaking at the site of the dam with a 1 in 500 annual exceedance probability (determined by normal measures of acceleration, velocity and displacement) but not less than shaking determined using a z factor of 0.13. › For a medium potential impact dam, an earthquake that would generate shaking at the site of the dam with a 1 in 250 annual exceedance probability (determined by normal measures of acceleration, velocity and displacement) but not less than shaking determined using a z factor of 0.13.
Flood threshold event	<ul style="list-style-type: none"> › For a high potential impact dam, a flood of water or other fluid flowing into the reservoir that has a 1 in 500 annual exceedance probability › For a medium potential impact dam, a flood of water or other fluid flowing into the reservoir that has a 1 in 250 annual exceedance probability.

What submitters said

There were 40 responses to the "do you agree with the proposed definition of moderate earthquake?" and to the question "do you agree with the proposed definition of moderate flood?" There were 39 responses to "do you agree with the proposed

definition of earthquake threshold event?" and 33 to the question "do you agree with the proposed definition of flood threshold event?"

The majority of submitters supported the proposed definitions, ranging from 61% for flood threshold event to 73% for moderate flood.

Figure 9: Dangerous dams

Do you agree with the proposed definition of “moderate earthquake”?

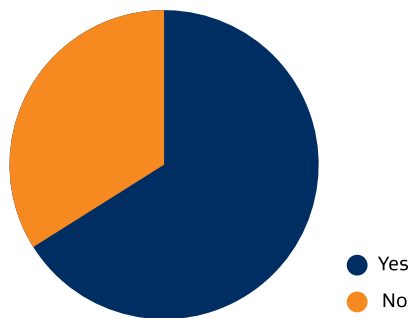


Figure 10: Dangerous dams

Do you agree with the proposed definition of “moderate flood”?

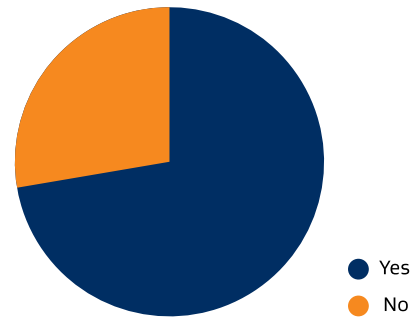


Figure 11: Earthquake prone dams

Do you agree with the proposed definition of “earthquake threshold event”?

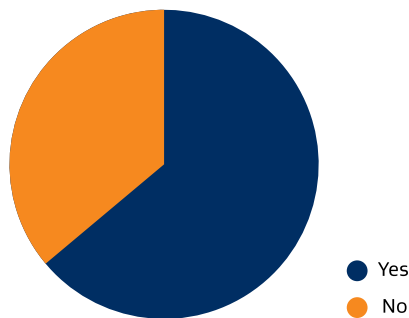
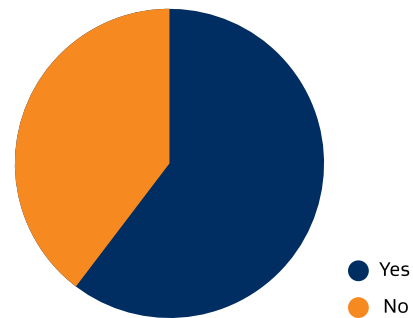


Figure 12: Flood prone dams

Do you agree with the definition of “flood threshold event”?



The response rate to these questions was lower than for many of the other questions. This may indicate less interest or that submitters did not understand the technical issues involved.

Submitters who raised concerns tended to fall into two groups. One group was those who were concerned that the proposed standards are lower than those in the New Zealand Dam Safety Guidelines. The other group had concerns of a more technical nature relating to how the standards are measured or applied.

Larger dam owners who were managing their dams under the New Zealand Dam Safety Guidelines tended to comment that the proposed earthquake and flood definitions have annual exceedance probabilities (AEP) that are lower than those recommended in the Guidelines. Similar to the comments that many of them made about the DSAP proposals, they expressed concern that the proposed earthquake and flood thresholds have the potential to lower industry standards and to undermine the Dam Safety Guidelines.

Other submitters, which included local government and engineers, made comments that were of a

more technical nature. Some submitters expressed a desire for a widely understood definition of earthquake magnitude that aligns with definitions used in other industries and with those used by the Building Code and by New Zealand Standard NZS 1170.

Owners of flood detention dams, most of them local authorities, suggested that they should be exempt from meeting earthquake resilience requirements because their dams hold no water for most of the time.

A small number of submitters asked for greater specificity in how “moderate flood” and “flood threshold event” are measured, with many asking for a measure based on peak flood inflow. One engineer commented that assessing flood risk to dams is particularly challenging and requires specialised skills and a tailored approach. Another engineer commented that NIWA does not provide rainfall data that enables the definitions, as proposed, to be assessed. The small number of irrigation dam owners who commented said that because their dams are filled by canal or pipe, the flood definitions are irrelevant.

Administrative requirements and costs

What was proposed

The Building Act requires forms to be prescribed for:

Dam classification certificate

Dam safety assurance programme (DSAP)

Annual dam compliance certificate

Dam Classification Certificate

It was proposed that the following information should be included in the dam classification certificate:

Information about the dam:

- > dam name
- > dam location
- > date of construction
- > building consent and/or resource consent reference
- > changes in design or operation since construction
- > dam purpose and type
- > height of the dam
- > maximum reservoir volume (in cubic metres)
- > description of spillway or flood control facility
- > flood capacity
- > relevant regional authority

Potential impact classification (PIC) (High, Med or Low)

Dam owner and operator with contact details

Certifying certificate from a recognised engineer and evidence of professional recognition

Recognised engineer's signature, name and registration number

Dam safety assurance programme (DSAP) form

The proposed information to be included in a DSAP form was:

Information about the dam:

- > dam name
- > dam location
- > date of construction
- > building consent and/or resource consent reference
- > changes in design or operation since construction
- > dam purpose and type
- > height of the dam
- > maximum reservoir volume (in cubic metres)
- > description of spillway or flood control facility
- > flood capacity
- > relevant regional authority

Potential impact classification (PIC) (High, Med or Low)

Dam owner and operator with contact details

A brief description of how each of the dam safety elements have been addressed for the dam, and indicating where these are addressed in the DSAP

A list of all supporting documentation, manuals and publications referred to in the DSAP and the location of this material
The documents and procedures that form the DSAP are attached
A statement on the location of the DSAP
A statement on the contact person and contact details with respect to the DSAP
A certificate from the recognised engineer that the DSAP meets the prescribed criteria and standards for the dam safety assurance programme
Evidence attached that the engineer is a recognised engineer
The recognised engineer's signature, name and chartered professional engineer registration number (or any future statutory equivalent)

Annual Dam Compliance Certificate

It was proposed that the annual dam compliance certificate should state that, except for identified, minor items of non-compliance, all procedures of

the DSAP have been complied with over the previous twelve months.

The proposed information to be included in an annual Dam Compliance Certificate was:

<p>Information about the dam:</p> <ul style="list-style-type: none"> > dam name > dam location > date of construction > building consent and/or resource consent reference > changes in design or operation since construction > dam purpose and type > height of the dam > maximum reservoir volume (in cubic metres) > description of spillway or flood control facility > flood capacity > relevant regional authority
Date of approval of DSAP, expiry date of approved DSAP
Potential impact classification (PIC) (High, Med or Low)
Dam owner and operator with contact details
A compliance statement that all procedures in the DSAP have been complied with during the previous 12 months, with the name, date, and signature of the dam owner
A certificate from a Recognised Engineer that they have reviewed the owner's reports and other documents relating to the procedures in the DSAP that the owner has followed in the previous 12 months, and that all procedures in the DSAP have been complied with during the previous 12 months
Evidence attached that the engineer is a recognised engineer
The recognised engineer's signature, name and chartered professional engineer registration number (or any future statutory equivalent)

What submitters said

A total of 62 respondents answered one or more questions about the information and certification

requirements for the proposed regulations. Most submitters (52) expressed partial support for the information and certification requirements but disagreed with one or more elements of the

proposals. Three submitters disagreed with all of the proposed information and certification requirements.

Few comments were made about the proposed information or certification requirements. Some submitters considered that it was a central government function to maintain a register of dams. No consideration has been given to national data collection; at this point it is expected that regional authorities will need to maintain a regional register of dams.

Some submitters thought that the information required to be included on a dam classification certificate could be simplified. Some submitters observed that the acronym for a dam classification certificate and a dam compliance certificate will be the same (DCC). This has the potential to cause confusion.

Dam owners who are currently following the New Zealand Dam Safety Guidelines were concerned about the potential for duplication of requirements between the Guidelines and the regulations. They wanted assurances that compliance with the Guidelines would also constitute compliance with the regulations.

A number of submitters expressed concern about the requirement in the Building Act to display a copy of the Annual Dam Compliance Certificate on the dam. A majority of dams lack a structure to which the certificate could be attached. Most dam owners considered that provision of on-line dam information was sufficient.

A small number of submitters provided comment about compliance costs for the proposed regulations. Based on analysis of these submissions, it appears likely that dam owners already following the New Zealand Dam Safety Guidelines face modest compliance costs in implementing the proposed regulations.

For dam owners not following the Guidelines, some stated that they faced significant costs in developing the administrative systems and dam maintenance systems to comply with the regulations. Some submitters, many of them local authorities, identified that they faced substantial cost in upgrading dams that will not meet the standards that the regulations will require.

NZSOLD Dam Safety Guidelines

Only 32 submissions answered the question “are you following the NZSOLD dam safety guidelines?” Of these, a majority of submitters (21) were following the Guidelines. However, this proportion is unlikely to be representative of all the individuals and organisations that submitted on the proposals, or of the wider dam industry. It appears from the comments made that it is predominantly larger dam owners who follow the New Zealand Dam Safety Guidelines.

Matters not within scope

What submitters said

Some of the submissions proposed changes that would require amendments to the Building Act. An example was a request from a number of submitters that a definition of “dam owner” be included in the Building Act. This is because dam ownership is, in some cases, difficult to determine.

A small number of submitters made comments that related to topics not consulted on as part of this review. For example, one submitter commented that irrigation ponds constitute a drowning risk and proposed that they should be regulated in the same way as swimming pools.

Figure 13: NZSOLD Dam Safety Guidelines
Are you following the NZSOLD dam safety guidelines?

