



Irrigation for a thriving and sustainable New Zealand

SUBMISSION

Proposed Regulatory Framework for Dam Safety

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Elizabeth Soal, Chief Executive Officer, Irrigation New Zealand

About Irrigation New Zealand

1. Irrigation New Zealand (INZ) represents over 3,500 irrigator members nationally, including irrigation schemes and individual irrigators. Our members include a wide range of farmers/growers – dairy and cropping farmers, horticulturalists, winegrowers. We also represent over 120 irrigation service industries – manufacturers, distributors, irrigation design and install companies, and irrigation decision support services.
2. As an organisation we actively promote best practice irrigation and carry out a range of training and education activities. Over the last 5 years we have trained over 3,000 irrigators on different aspects of irrigation best practice to improve water use efficiency and better manage environmental effects.
3. INZ members share many of the same goals as other New Zealanders:
 - to reduce their environmental footprints and see improvements in the health of our waterways
 - to contribute to the wellbeing of their communities
 - to provide for a sustainable future for New Zealand.

General Comments

4. We support the principles stated by the Minister - that dams must be safe and durable and that they need to be managed appropriately; proportionate to the risk they pose.
5. The language in the Building Act 2004 and tenor of the *Proposed Regulatory Framework for Dam Safety* document indicate that much of the underlying logic that is applied comes from considering dams that are in valleys, streams, and rivers. While there are some dams across valleys and similar geographical features used for agricultural/horticultural purposes, including irrigation, a significant proportion of the water storage facilities are “ponds” often referred to as On Plains Storage (OPS) or Turkey Nest. Most often these ponds have been built by digging down the centre of the pond and using the resultant material to build the walls. This results in a considerable proportion of the storage volume being below the original ground level and not able to escape in the hypothetical dam failure or breach.
6. Virtually all dams used for agricultural/horticultural purposes have strictly controlled filling, often with water being pumped into them. They are not exposed to extreme weather and flood events.
7. Typically, neither dams across geographical features nor OPS facilities are at all close to population centres or major infrastructure. Even the bigger facilities on farms/growing areas (that are still very small compared to hydro dams and the like) seldom pose any significant potential impact. As stated in previous submissions over

the years on these dam safety matters, we seek to minimise the expenses to farmers/growers and costs to the economy of expending undue effort on storage facilities that quite obviously have very low potential impacts.

8. The Building Act applies to a very wide range of dams, both in terms of the type and size of the dam. For example, it includes high dams like Benmore and Maraetai with reservoirs covering many square kilometres, situated on major rivers that flood at many times the normal flow. At the other end of the scale, an OPS pond facility that is only the size of a rugby field, and only receives water when it is pumped in, is also covered within the framework proposed in these regulations. In our view, the regulations would be much more effective if they recognised the wide differences in size and situation more explicitly.
9. Our recent sampling shows that around 93 percent of our farmer/grower members' storage facilities are below 200,000m³, a fairly small amount of water to be impounded in most geographical circumstances. In common with the New Zealand Inventory of Dams (NZID), we do not have further fine-grained detail on the height or configuration of the facilities.

Submission

Knowledge of Dams

10. In section 3, Background of the discussion document, the subsection "What we know about dams in New Zealand" makes the point that there is incomplete data (i.e. height and volume) available for over 3,000 of the 3,284 dams in the NZID. The proposed regulations are therefore being drawn up on a foundation of imprecise information. Given the wide range in dam size and type (and including canals – see below).

We Submit that: There is a need to consider a much wider range of circumstances and hence the appropriate way to efficiently achieve the propose of the proposed regulations.

We offer to assist: In the gathering of more information on dams to improve the regulations.

Canals

11. In the respect that canals impound water (fluids) it is, in principle, understandable that they are included as a particular case of a "dam" in the Building Act 2004. However, when compared to either an in-stream/valley dam or pond/turkey nest storage:

- a. The engineering aspects of considering a canal will require quite different factors to be considered.
 - b. The contributory factors that might lead to a hypothetical failure breach are quite different.
 - c. The geographic and spatial factors that will influence the potential impact determination are quite different.
 - d. The sequence of steps to determine the potential impacts and/or provide the protection in the case of a hypothetical failure breach may well be quite different.
12. The Building Act, in section 134BA recognises that different sections of a canal may have different classifications. In the case of small canals, the characteristics of water release in a hypothetical failure breach, are very different to the traditional dams that are mostly contemplated within these proposed regulations.
13. In the event a canal breached, the rate of discharge of water is limited by the upstream canal characteristics. Given the regulated discharge rate, the total volume of water lost will typically be limited by the operation of control structures and control devices on the canal.
14. As canals are included in the Building Act 2004, we have been considering potential wording in these regulations that would overcome the quite fundamental problems. We regret to advise that at the time of writing we have been unable to come up with feasible and well thought through proposals. However, in the strongest possible terms:
- We submit that:** Canals need to be considered as a particular case, in practice most effectively within a suitably convened Working Group, to determine appropriate regulations that can then written explicitly to suit. This is the only way we see to avoid fundamental problems in the application of the Building Act 2004 and these regulations to canals.

We would like to offer to be involved in the search for the solution to this issue. It is likely that some of our members will have specific expertise that can be accessed to assist with this matter.

Storage below ground level has no impact

15. The interpretation for "Large Dam" in the Building Act 2004 is intended to apply to the volume of water (fluid) that can *escape* to surroundings in the event of a breach. However, the interpretation, along with further detailed wording, in the Act may be interpreted as the *total* volume of the dam storage.
16. A significant proportion of the dams operated by our members are On Plains Storage ponds, known as Turkey Nests, constructed using the cut-to-fill method. This results

in a significant proportion of the dam volume being below the original ground level. It would be not uncommon for up to 40 percent of stored volume to be below original ground level.

17. It has come to our attention that different regional authorities appear to be interpreting the Building Act differently in relation to volume stored below original ground level.
18. **We submit that:** The regulations need to clarify the interpretation in the Building Act 2004 that sets the interpretation for a large dam as having a height of four or more metres and holds 20,000m³ or more of water or other fluid. Specifically, the regulations should clarify the statement applies to the volume of water (fluid) volume that is held back by any embankment and not the water (fluid) that is below the original ground level. This clarification should be made in Section 2 – Table 1 extending the proposed definition for the Term “Classifiable dam” and extended upon in Section 5 under the heading “Guidance on calculating reservoir volume.”

Classifiable Dam Size

19. In section 5 “Core Elements” Under Step 1, Heading *Classifiable Dams*, MBIE provides a background of its 2013 decisions to step down from the then proposed height of eight metres holding 20,000m³ or more, and the height of four meters or more holding 100,000m³ of water or other fluid. It should be noted that these heights and volumes came out of considerable research, including overseas regulations, that were formed over a considerable time.
20. **We submit that:** That the combination of the Building Act 2004 interpretation for a large dam set at a height of four metres or more holding 20,000m³ or more of water or other fluid and the proposal in these regulations to also set classifiable threshold at less than four metres in height and at or above 30,000m³ in volume, results in a combined threshold that is well beyond conservative.

(It is for this reason that we make other submissions herein with the objective of providing an effective, robust yet economic set of criteria for the proposed regulations.)

Referable Dams

21. Dams that are less than four metres in height, especially when impounding modest amounts of water, say, less than 200,000m³ have comparatively little potential energy to expend in the case of a hypothetical failure breach. In most geographical situations, this energy would be quickly dissipated as the water either spreads or flows into constrained channels.
22. Dams that are less than four metres in height, especially when impounding modest amounts of water, would in the case of a hypothetical failure breach, degrade comparatively slowly due to the lack of head and resultant lower water velocities. This

means that it is very unlikely that such a dam would allow large volumes of water to escape in short time frames. In these circumstances, the surrounding flat area and/or a more restricted pathway can handle the resultant flow without any significant impact on surroundings, people or infrastructure.

23. In particular, in almost all situations small ponds, (On Plains Storage or Turkey Nest) are situated so that the energy of any hypothetical failure breach would be quickly dissipated because there is a large flat or fairly flat area surrounding them to accept the water spread.
24. The situation for in stream/in river/in valley dams, when a modest amount of water is released by a small dam in any hypothetical failure breach, would result in it flowing along a fairly restricted pathway that past natural flood events have taken.
25. Regional Authorities have, under section 134 (b) of the Building Act 2004, the ability to require an owner of a dam that is Referable to classify it. This means that in an atypical situation for small dams, where there is a reasonable indication of a potential impact, it can be dealt with effectively.
26. From past submissions and correspondence, it is apparent that some Regional Authorities do not consider this to be a desirable role for them. However, in practice the numbers of such situations will be quite low and furthermore they will be fairly obvious from location of a Referable dam.
27. Regional authorities have a practical protection against dam owners taking a reactive approach because the cost of such action under the Building Act 2004 will quickly exceed the cost of having the Potential Impact Classification determined.
28. Regional authorities also have, under section 134A of the Building Act 2004, the ability to require an owner of a dam that is Referable to classify it if the dam is located within a designated area.
29. When regulations were previously being considered, the two thresholds that were proposed for the classifiable category were 20,000m³ or more volume of water or other fluid and a height of eight metres or more, and 100,000m³ or more volume of water or other fluid and a height of four metres or more. Taking into account the very conservative threshold in the Building Act 2004 it seems appropriate to also consider a very conservative but more realistic threshold to define a Referable dam.
30. **We submit that:** The Referable dam category that is provided for in the Interpretations of the Building Act 2004 be retained.
31. **We submit that:** A Referable Dam be defined largely as was previously proposed when regulations were previously being prepared but reflecting the very conservative height now proposed for these regulations.

32. **We submit that:** The following definition is added into Table 1 in Section 2 and referred to a second time, with more description if necessary, in Section 5 under the heading "Referable dams."

Referable Dam – "A dam which:

- a) has a height of less than 4 metres and holds less than 100,000 cubic metres volume of water or other fluid; and
- b) is not a classifiable dam; and
- c) is, when the dam is over a river, stream or valley bed, within one kilometre upstream of a feature.
- d) is, when the dam is turkey nest type, within 500 metres of a feature
- e) a feature means one or more of the following:
 - i. residential houses in a village of more than five houses
 - ii. emergency facilities (including hospitals, police stations or fire stations)
 - iii. community or educational facilities
 - iv. large industrial or commercial facilities
 - v. state highways or rail lines".

33. **We submit that:** The description of the designated area in the Building Act 2004, Section 134A (2) should be defined as:

Designated Area – "An Area that:

- a. Is, when the dam is over a river, stream or valley bed, within two kilometres downstream of the dam structure; and
- b. contains a feature within one kilometre downstream of the dam structure,
 - a. is, when the dam is turkey nest type, has a feature situated within 750 metre radius of it,
 - b. a feature means one or more of the following:
 - i. residential houses in a village of more than five houses
 - ii. emergency facilities (including hospitals, police stations or fire stations)
 - iii. community or educational facilities
 - iv. large industrial or commercial facility
 - v. state highways or rail lines".

Recognised Engineers

34. It is notable that the tables in section 5, Step 2, used to assess the Potential Impact Category (PIC) are sourced from the New Zealand Society of Large Dams (NZSOLD) guidelines. From the point of view of consistency this is understandable because this will assist the Recognised Engineers to quickly apply their knowledge and experience to the PIC assessment and Dam Safety Assurance Programme preparation.

35. However, we have real reservations about this approach in that it demonstrates how a methodology, originally developed for big dams, is being applied to very much smaller dams. We are concerned that the mindset of the engineers undertaking the potential impact assessment will not be recalibrated sufficiently for dams that are orders of magnitude smaller, resulting in outcomes that are beyond conservative.
36. The Building Act 2004 specifies the activities to be undertaken by Recognised Engineers. In section 4, these proposed regulations:
- a. Set out prescribed competencies that are to be held by Recognised Engineers. The proposed prescribed competencies are listed but it is stated that the engineer must meet "all or some" of the competencies.
 - b. Set out in the Roles and Responsibilities, that owners of dams will need to ensure that the engineer they engage has the necessary experience and qualifications.

This combination has the potential to create problems for small dam owners who may not be sufficiently expert to judge the particular set of competencies needed by the engineer for each of the dams under their ownership.

37. The engineer's registration system and the role of the engineer's professional body, Engineering New Zealand, in relation to licencing/registering engineers is currently under review, with outcomes as-yet unknown. We are concerned that, with these regulations being introduced concurrently, this will result in unintended outcomes in one or more aspects of these regulations.
38. We are concerned that as the submission and drafting process proceeds there will be a tendency toward increasing the number and prescriptive nature of the rules that the Recognised Engineers are required to work to. The problem with such blanket rules is that they will not neatly fit the full range of situations encountered when evaluating the number and wide variety dams, canals and flood protection bunds that are spread throughout NZ.
39. **We submit that:** There needs to be specific acknowledgement within the regulations, in Section 5, Core Elements, that the tables used for classifying the potential impact are taken from NZSOLD guidelines and attention is drawn to the fact that there is more complete information therein.
40. **We submit that:** There needs to be an explicit note in Section 5, that many of the dams now being classified are orders of magnitude smaller in size and in inherently lower impact locations than the large dams that were the focus of the NZSOLD guidelines when they were originally written. Care needs to be exercised when interpreting NZSOLD guidelines that have been explicitly developed for such comparatively big dams.

41. **We Submit that:** In Section 4, under *Proposed prescribed competencies* (p. 25) the first sentence is changed to read: "It is proposed that a Recognised Engineer meets all or most of the following competencies."
42. **We Submit that:** In Section 4, under *Proposed prescribed competencies* (p. 25), an additional bullet point is added that reads: "A sound understanding of relevant statutes, regulations, regional authority practices and the NZSOLD guidelines."
43. **We Submit that:** Determining the specific competencies required to undertake PIC evaluations on any particular dam requires the engineers to have a responsibility to ensure that they have sufficient breadth of the prescribed competencies for the particular situation.
44. **We Submit that:** There should be a requirement in the regulations placed on *MBIE to maintain a publicly available register of Recognised Engineers and their particular competencies (in terms of the list under the heading *Proposed prescribed competencies* on p. 25 in Section 4).

*In the event that the role of the engineers' professional body (Engineering New Zealand) in registering engineers is clarified, this function could be undertaken by them.

45. **We generally support** the regulations as they are written in relation to Section 5 Core Elements. Providing there is an explicit note added (see 40, above) calling attention to the work being appropriate for the scale of the dam (or canal when the regulations are written) then we oppose any further details being added. While we have reservations about some details, as submitted upon above, we support the principle of having suitably experienced engineers make the PIC determination without being unduly fettered by further rules that are unlikely to be appropriate in all circumstances.

Implementation Time

46. We understand that there are only a small number of experienced dam engineers that would currently qualify as Recognised Engineers. As pointed out (see 10 above) we are of the view that the number of dams that will exceed the dam classification threshold will be substantially higher than anticipated. We are therefore concerned that having too much work ahead of too few engineers will have undesirable effects. (such as lowering of engineer's experience standards, inefficient layering of scarce expertise by engineering consultancies, price gouging).
47. **We submit that:** The implementation phase is in tiers and ranked and the first sentence under the heading Implementing the proposed dam safety regulations in Section 4 is replaced by:

A dam that holds 150,000m³ or more water or fluid will come under the regulations 12 months from the date they are gazetted.

A dam that has a height of less 8 metres and holds 75,000 or more and less than 150,000 cubic metres volume of water or other fluid; and

- f) is, when the dam is over a river, stream or valley bed, more than one kilometre upstream of a feature.
- g) is, when the dam is turkey nest type, more than 750 metres away from a feature
- h) a feature means one or more of the following:
 - vi. residential houses in a village of more than five houses
 - vii. emergency facilities (including hospitals, police stations or fire stations)
 - viii. community or educational facilities
 - ix. large industrial or commercial facilities
 - x. state highways or rail lines,

will come under the regulations 24 months from the date they are gazetted.

All dams will come under the regulations 36 months from the date they are gazetted.

The owners of a dam that is either a Referable dam or a Classified dam must notify their regional authority of the size and location of the dam within 12 months after the regulations are gazetted.

47. **We submit that:** When the specific canal regulations are prepared, a similar tiered implementation shall be designed and incorporated into the Regulations.

Note: Nothing in the tiered and ranked implementation timing proposed here is intended to override the rights of a regional authority to require an owner to either classify a dam sooner or require it to be reported as a Referable dam if the regional authority believes on reasonable grounds it has a potential impact that justifies the regulation to be applied sooner.

Overlap between RMA, Building Act and Regulations

48. In recent times building a dam has, under the Resource Management Act, required a resource consent. Such consents most often have conditions that set out matters that are now also covered under the Building Act. The more detailed requirements set out in these regulations will most likely further increase the overlap between typical resource consent conditions and the Building Act 2004 that will include these regulations.
49. Dam owners could find that they are attempting to apply different and potentially conflicting rules under the Resource Management Act and the Building Act.

50. The proposed regulations address this issue in Section 3, Background, but definitive guidance or requirements are neither embodied in that section nor within the later sections.
51. ***We submit that:*** A clause be added to these regulations setting out a requirement that when an application is made by the dam owner, regional authorities must take positive steps under the provisions of Section 127 of the Resource Management Act to cancel consent conditions that overlap with a Dam Safety Assurance Programme (DSAP) that has been introduced under the Building Act and these regulations.

Irrigation New Zealand is happy to present and discuss its submission through any further consultation process.