

## Building Consent Guidance

# Review of existing dams

### Purpose:

The purpose of this guidance is to assist owners of water (or other fluid) retention structures to determine whether the identified structure is required to comply with the Building (Dam Safety) Regulations 2022.

This document contains:

- Guidance for determining whether the water (or other fluid) retention structure meets the definition of a dam in accordance with the Building Act 2004, and if so,
- Advice for measuring and calculating the height and volumes of the dam to understand whether it meets the definition of a classifiable dam in accordance with the Building (Dam Safety) Regulations 2022.

**Note:** It is important that this guidance is read alongside the Ministry of Business, Innovation and Employment (MBIE) documents:

- Dam Safety Guidance -
  - <https://www.building.govt.nz/managing-buildings/dam-safety/resources/>
- Measuring and calculating the height and volume of agricultural dams
  - <https://www.building.govt.nz/managing-buildings/dam-safety/resources/>

### Section 1: Property details

Does the identified structure on the property meet the definition of a dam in accordance with section 7 of the Building Act 2004?

#### What the law says:

A **dam** as defined by Section 7 of the Building Act 2004;

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

An **appurtenant structure** as defined by Section 7 of the Building Act 2004, means a structure that is integral to the safe functioning of the dam as a structure for retaining water or other fluid

#### Method of determining if the identified structure is considered a dam

**Step 1:** Determine whether the features of the identified structure on the property meet the definition of a dam in accordance with section 7 of the Building Act 2004 as noted above.

**Step 2:** Complete section 1 of the Review of Existing Dams form (AC2418). If you do not believe the identified structure meets the definition of a dam, please briefly explain why in the space provided on the form.

## Section 2: Dam details and measurements

To understand whether a dam is considered a classifiable dam, the height and volume need to be known. These details may be obtained from the as-built construction documentation, or the building or resource consent records. However, if these details are not readily available, physical measurements of the dam will need to be taken.

This guide will help you estimate the:

1. Height of the dam
2. Surface area of the reservoir
3. Dams stored volume (retained by the dam at the crest level)
4. Normal operating volume (retained by the dam at the spillway level)

### Height

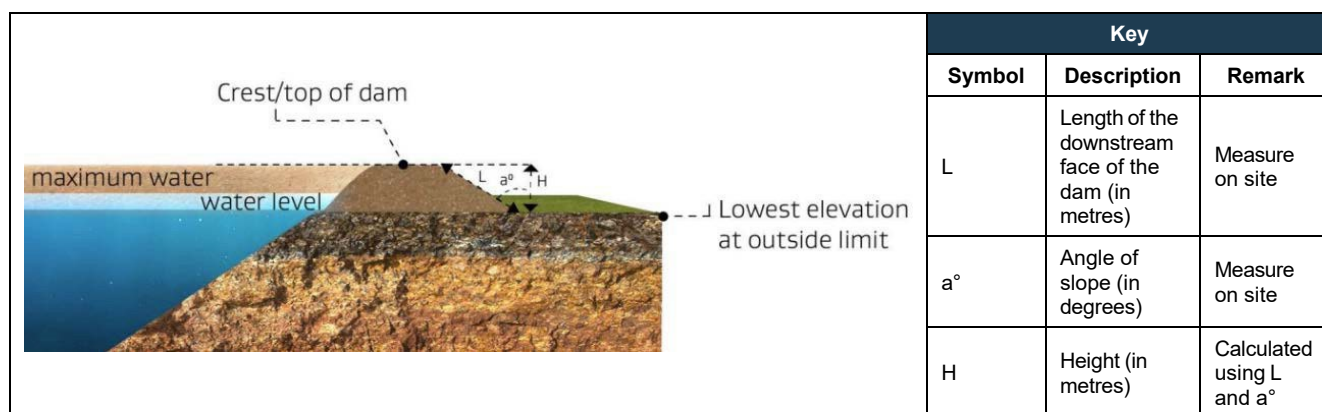
The most straightforward method of identifying the dam height is to obtain this measurement from as-built construction documentation. However, if this is not available, then on-site measurements of the dam will need to be taken.

#### What the law says:

The **height** of a dam as defined by Section 133B of the Building Act 2004 is the vertical distance from the crest of the dam and must be measured;

- a) in the case of a dam across stream, from the natural bed of the stream at the lowest downstream outside limit of the dam; and
- b) in the case of a dam not across a stream, from the lowest elevation at the outside limit of the dam; and
- c) in the case of a canal, from the invert of the canal.

The measurements to determine the height for a typical dam (not across a stream) are taken from the lowest elevation at the outside limit of the dam. The below diagram illustrates where to take these measurements from.



#### Method for calculating the dam height (H)

**Step 1:** Physically measure the length (L) of the downstream face of the dam.

**Step 2:** Physically measure the angle (a°) of the slope (with a protractor, clinometer or a clinometer app on a mobile phone).

**Step 3:** Calculate the height (H) of the dam by multiplying the length (L) by the cosine of the angle of the slope (a°) as per the following formula:

$$\text{Height (H)} = \cosine (a^\circ) \times \text{length of the downstream face (L)}$$

**Step 4:** Record the height (H) on the Review of Existing Dam form (AC2418).

## Dam volume

The next step is to calculate the dam's stored volume and the normal operating volume of the dam. The most straightforward method is to obtain these volumes from as-built construction documentation. However, if this is not available, then the surface area of the dam's reservoir will need to be measured and the volumes estimated based on simple calculations.

### What the law says:

As defined by Section 7 of the Building (Dam Safety) Regulations 2022, measuring a dam's stored volume for the purpose of assessing whether a dam is a classifiable dam, the stored volume of water or other fluid does not include,-

- a) in the case of a dam across stream, water or fluid that is lower than the natural ground level at the lowest downstream outside limit of the dam,
- b) in the case of a dam not across a stream, water or fluid that is lower than the natural ground level at the lowest elevation at the outside limit of the dam,
- c) in the case of a canal where the canal invert is below the natural ground level, water or fluid that is lower than the natural ground level at the lowest elevation at the outside limit of the canal structure.

The two volumes that need to be assessed are:

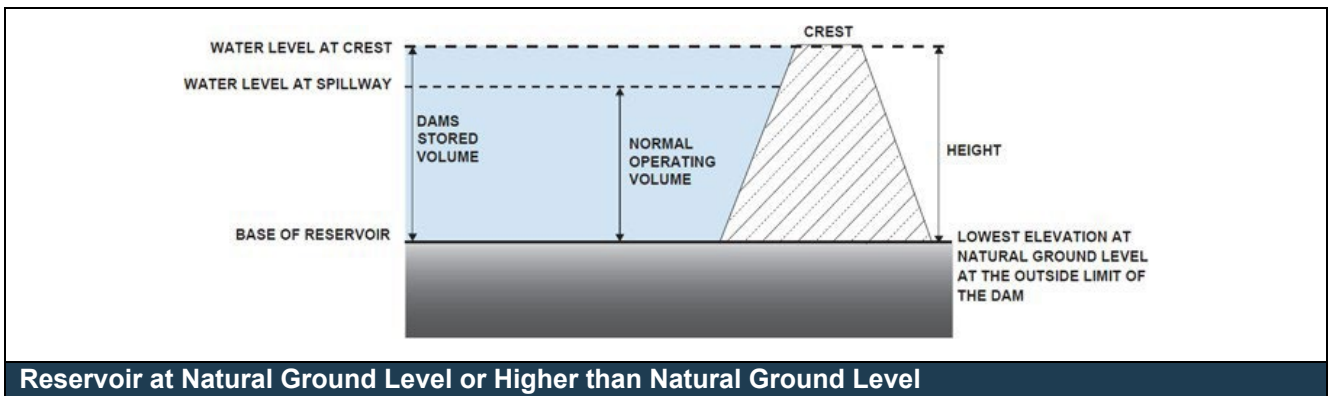
### Dams Stored Volume

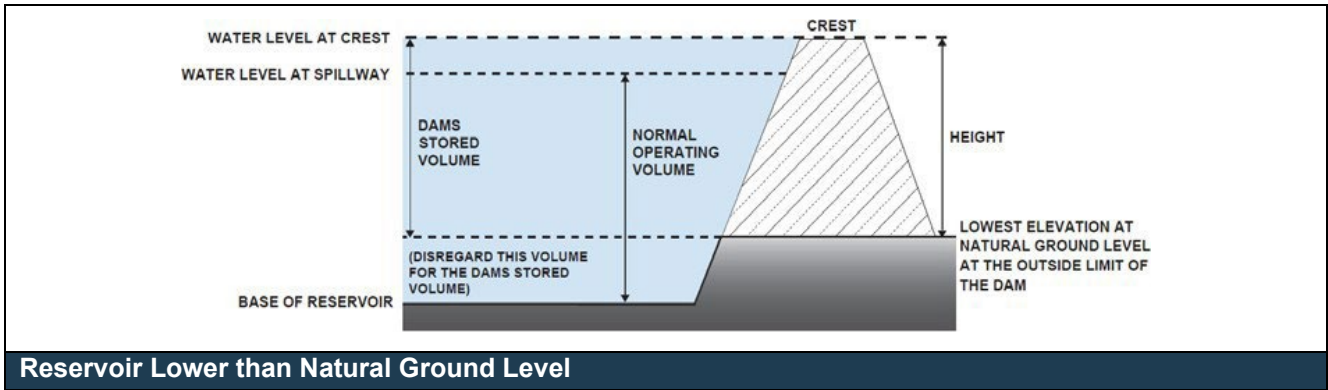
The volume of fluid retained by the dam wall that could potentially be stored within the dam above the natural ground level on the outside limit/face, including water stored between the freeboard/spillway level and the dam crest. This is the contents of a dam which could affect the surrounding environment if an uncontrolled release occurred due to a failure of the dam.

### Normal Operating Volume

The typical volume of fluid stored in the dam during normal operating conditions up to the freeboard/spillway level and including any fluid stored below ground level.

These volumes are illustrated in the diagrams below for typical dams which store water above natural ground level and those which store water both above and below natural ground level. If the reservoirs shape is complex, then the dam owner should consider the support of a technical practitioner and/or use other methods to determine the dam's stored volume.



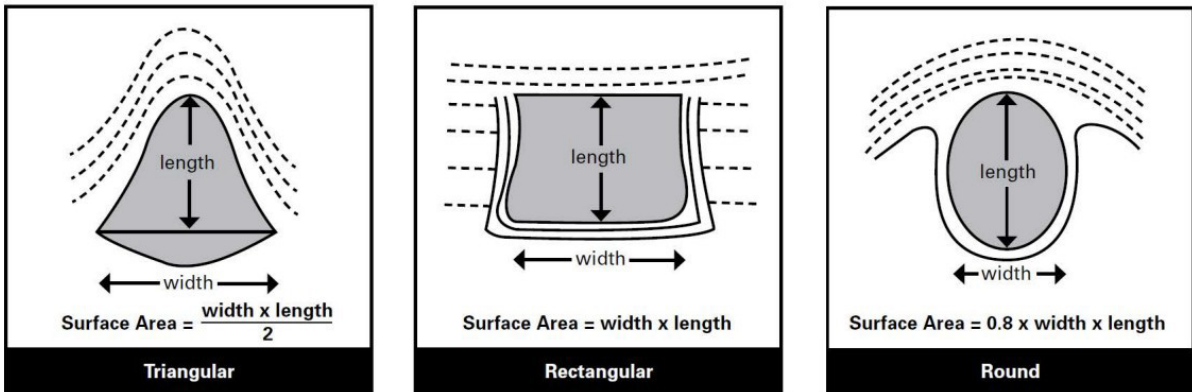


**Note:** Water stored below ground level is excluded from the dam's stored volume as it is not being held back by the dam, and therefore will not be released due to failure of the dam.

**Method for measuring the dam's stored volume**

**Step 1:** Measure the surface area of the dam's reservoir by either:

- **Aerial image method**
  - Locate the dam on Google Earth or other online mapping software and draw around the perimeter of the reservoir using the "measure distance and area" function. The outcome is the surface area (m<sup>2</sup>) of the dam's reservoir.
- **Physical measurement method**
  - The diagram below explains how to measure the surface area of the dam reservoir. If the reservoir's shape is complex or does not match a shape shown in the diagram, then the dam owner should consider the support of a technical practitioner and/or use other methods to determine the dam's stored volume.



**Step 2:** Calculate the dams stored volume (at crest level) as per the following formula:

Dams stored volume (m<sup>3</sup>) = 0.4 x surface area x height (H) of the dam

**Step 3:** Record the dams stored volume in section 2 of the Review of Existing Dams form (AC2418).

**Step 4:** Calculate the normal operating volume (at spillway level) as per the following formula:

Normal operating volume (m<sup>3</sup>) = 0.4 x surface area x depth of the reservoir

*(Note: the depth is the distance between the base of the reservoir and the freeboarding/spillway)*

**Step 5:** Record the normal operating volume in section 2 of the Review of Existing Dams form (AC2418).

## Classifiable dam

The Government has announced its decision to amend the definition of a 'classifiable dam' in regulation 5 of the [Building \(Dam Safety\) Regulations 2022](#).

Dams are now 'classifiable' if they are **4 or more metres in height and store 20,000 or more cubic metres volume of water, or other fluid**.

The regulations will no longer apply to dams that are less than four metres high, regardless of their storage volume.

For more information on dam safety and the updated thresholds, visit the Building Performance website: <https://www.building.govt.nz/managing-buildings/dam-safety/>

### Method for determining if the dam is considered a classifiable dam

**Step 1:** Determine if the height and dam's stored volume meets or exceeds the threshold for a classifiable dam.

**Step 2:** Record this on the Review of Existing Dams form (AC2418).

If the structure meets the definition of a dam under the Building Act 2004 and is considered a "classifiable dam", then the dam owner is obliged to fulfil the legal requirements of these regulations.