

What's all this about dams?

■ Introduction

Most dams are small earth structures that were constructed to provide a water supply for stock or irrigation. In recent years dams have been built more for aesthetic reasons.

This fact sheet is aimed at people who have a dam or are thinking of building one. It describes the adverse effects that dams can have on the environment and communities and ways they can be avoided or mitigated. It also contains information about alternatives to building dams, dam removal and resource consent requirements.

■ Rules and resource consents

The rules relating to the damming of water are set out in the Auckland Regional Plan: Air, Land and Water. The Plan contains rules relating to the construction of a new dam on any stream that contains water year-round (flowing or in pools) as well as for existing on-stream dams. It also outlines requirements for off-stream dams.

■ Constructing new dams

The construction of dams on streams with the highest natural values is prohibited. Otherwise, resource consents are required for new on-stream dams. Off-stream dams can be built without consent, subject to size limits and other conditions. You must notify the Auckland Regional Council (ARC) of your intention to build a new dam before you start construction.



■ Existing dams

Existing small earth dams generally do not require resource consent, but must meet conditions e.g. relating to maintenance. Larger existing dams, and those with large catchments, do require consent.

Dams can be removed or maintained without resource consent, subject to standards being met.

So what's the problem?

Dams are generally constructed to provide an economic or social benefit. But dams built on rivers or streams involve significant modification of the environment. This can have adverse effects on stream ecology as well as people and communities such as:

Changes to stream water quality and habitat

Dams change a shallow, flowing-water environment to a deeper, still-water habitat.

What follows is an increase in water temperature and nutrients and a reduction in oxygen levels compared to the incoming water. High levels of nutrients can result in algal blooms, some of which can be toxic to humans and stock.

Most native fish and other native freshwater species are not well adapted to living in dammed environments.

Exotic fauna and flora

In contrast, dams provide an excellent habitat for exotic fish, e.g. koi carp and mosquito fish that both compete with and feed on native fish. This has probably resulted in the decline of native species in some rivers and streams.

The increased water temperature in dams combined with nutrient rich water from rural runoff promotes the growth of exotic aquatic vegetation (e.g. oxygen weed), a major threat to native freshwater plant life.

Reduced stream flow and water availability

Because the water level in dams drops during periods of low-flow, less water flows downstream, especially when water is also being pumped out. This can create problems for water users and stream ecology.

Barriers to fish passage

Dams without fish passage and incorrectly installed culverts prevent some fish from accessing otherwise suitable upstream habitat.

Dam outlets are often made with culvert pipes that have a hanging outlet, creating a barrier even for fish species with a 'climbing ability'. In addition, dam outlets are often constructed on a steep angle, through which water may flow faster than the climbing or swimming abilities of native fish.

Dam failure

The failure of dams can cause damage to property and to downstream ecosystems. Dam failure



Koi Carp



Native Redfinned Bully



Native Koura

is most likely during or soon after construction, but can also occur later. Factors that can cause dam failure include:

- Inadequate maintenance e.g. allowing the growth of vegetation other than grass on the dam embankment
- Erosion e.g. of spillways
- Poor design e.g. undersized flood spillways



A poorly maintained dam

Effects on neighbours

The construction or existence of a dam, big or small, can become a contentious issue between neighbours. In some cases, new landowners 'inherit' a dam, or a part of a dam that is not contained within one property.

A dam can affect the drainage of – or even submerge – neighbouring property when built too close to an upstream or adjacent boundary, or when the overflow pipe is set too high.

This may affect a neighbour's access across a stream or render the land useless. Dams can also be constructed too close to a downstream boundary, which can cause erosion or drainage problems on the neighbouring property.

Is there a better alternative to building a dam?

Think about why and where you want to build the dam? There may be equally good or better alternatives that won't create problems for the environment or for neighbours. Consider:

If a water supply is required

- Drilling a bore or installing tanks to catch roof water for stock supply
- Where bore yields are low and streams dry up in summer, a dam may be the only reliable year-round supply of water. In such cases, consider constructing a dam in an 'off-stream' location e.g. in a gully bottom fed by rainfall runoff rather than a permanently flowing stream

If access across a watercourse is required

- Installing a well-constructed stream crossing. This involves placing the base of the culvert slightly below the stream bed, allowing the free flow of water and passage of fish through it

If the watercourse or wetland is in a degraded state

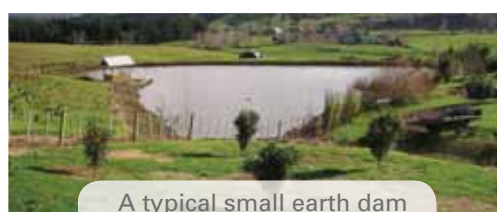
- Fencing and planting the stream margins or existing wetlands in places where pugging by stock has left them poorly defined and allow these systems to grow naturally, instead of building a dam and flooding the area. This will enhance aesthetic and ecological values

If you still need to build a dam

- Look for places to build a pond or dam that are less likely to harm stream environments or wetlands such as areas that catch rainfall runoff or have intermittent flow



A correctly installed culvert



A typical small earth dam



An off stream dam

■ I've already got a dam – what can I do about it?

Consider the following:

- Is the dam valuable i.e. as a source of stock drinking water or as a stream crossing?
- Are major repairs required e.g. to fix erosion and slumping or to remove vegetation?
- The long term maintenance required to keep it in a safe condition

■ Dam decommissioning

If the dam is more of a burden than a benefit it could be worth decommissioning it. Alternatively you could convert the dam to a stream crossing by enlarging and/or lowering the outlet. These decisions will cost you money and could disturb the stream in the short-term, but there are clear long-term benefits including:

- The return to a more natural flowing stream environment which, combined with fish passage, will provide a better habitat for native fish and other freshwater species
- Areas that were once submerged will re-vegetate and become ideal habitat for wetland plant and animal species
- No need for ongoing dam maintenance. The long-term cost savings may outweigh the cost of decommissioning

■ Improvements

Where a dam continues to be an asset there are steps which can be taken to address the environmental effects the dam may be causing, including:

- If the dam is on a permanently flowing stream, improve outlets to provide for fish passage
- Plant the stream's riparian margins downstream of the dam to mitigate poor quality water leaving the dam
- Fencing the dam and pond from stock

■ For more information

The ARC has a range of fact sheets and guidelines that provide information about dams, wetlands and fish passage. Copies are available online at www.arc.govt.nz or upon request. Related topics include:

- Auckland Regional Plan: Air, Land and Water
- Fact sheet: What you Need to Know Before you Build a Dam in the Auckland Region
- Fact sheet: Wonderful Wetlands
- Fact sheet: Wonderful Wetlands: Wetland Restoration and Planting Guide for the Auckland Region
- Dam Assessment Guide
- Fish Passage Guidelines for the Auckland Region, ARC technical publication 131
- Fact sheet: Riparian Streamside Planting Guide
- Riparian Zone Management, ARC Technical Publication 148
- Dam Safety Guidelines, ARC Technical Publication 109

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