

Rock ramps

A low rock ramp downstream of a culvert will help prevent hanging outlets and other erosion problems by slowing down the flow of water at the outlet.

To allow fish passage, build your rock ramp the width of the stream and take care that your rock placement doesn't cause water to back up in the culvert at high flows.

Large rocks are placed across the stream bed to form a zigzag stairway. This will slow water flow and form small pockets of still water and eddies in which fish can rest. Make sure there is at least one clear channel of water that meanders through the rock ramp at low stream flows.

The cross section of the rock ramp from bank to bank should form a shallow 'v' shape to help ensure suitable water depths for fish at a variety of flows.



A rock ramp fish pass, with rocks forming a zigzag pattern across the stream bed to reduce flow and provide pockets of still water/eddies where fish can rest as they move upstream.

MORE INFORMATION

For more information please contact our land management team on **0800 002 004**.

Thanks to Greater Wellington Regional Council for sharing their 'Fish-friendly culverts and rock ramps for small streams' brochure concept and Horizons Regional Council, Manawatu, for their fish and culverts photos.



Redfin bully



Torrent fish

Contact us:

For further information contact Northland Regional Council
Private Bag 9021, Whāngārei Mail Centre, Whāngārei 0148
P: 09 470 1200 | **F:** 09 470 1202 | **Freephone:** 0800 002 004
24/7 Environmental Hotline: 0800 504 639
Website: www.nrc.govt.nz | E-mail: mailroom@nrc.govt.nz
Facebook: www.facebook.com/NorthlandRegionalCouncil
Twitter: www.twitter.com/NRCExpress

February 2014



Fish-friendly culverts and rock ramps in small streams

- > Tips for fish-friendly culverts
- > Rock ramps

Putting Northland first



Fish-friendly culverts and rock ramps in small streams

The survival of many of our freshwater fish species depends on their ability to migrate between rivers and the sea, or to move upstream to spawn.

Poorly designed or installed culverts that restrict fish passage can cause a decline in freshwater fish numbers.

You can help ensure a successful journey for our freshwater fish by following these simple guidelines for building culverts and rock ramps in small streams.

CULVERTS are placed in rivers and streams to enable people and stock to cross safely and easily. Fish can't get up culverts unless they are built and installed properly.

ROCK RAMPS are a simple solution for fish passage over low obstacles such as culvert outlets.



Longfin eel



A well-designed culvert allows for fish to move through as part of their lifecycle

WHY DO FISH NEED PASSAGE?

New Zealand's freshwater fish are part of our natural freshwater ecosystems. They are a traditional food source and an important part of our recreational and commercial fishery.

Northland has 22 native freshwater fish species, and 14 of these need to migrate between freshwater and the sea as a necessary part of their lifecycle. For example, whitebait – which are the youngsters of five of our native fish species – move upstream to live as adults.

Other freshwater fish, such as the introduced trout, must also be able to travel upstream to spawn.

These fish must pass through culverts on their journeys – if their passage is restricted, it can seriously impact on fish populations in our rivers and streams.

As well as providing for fish passage, a well-designed culvert will reduce the risk of flooding and erosion both upstream and downstream.

INSTALLING A NEW CULVERT

If you're planning to install a new culvert in a stream, you may not need a resource consent from Northland Regional Council, but there are certain standards required, such as:

- The culvert must be no longer than 25m and large enough to not cause flooding or erosion on other properties; and
- It should not hinder fish passage, which can usually be provided for quite easily.

If you are unsure whether you need a resource consent, contact our consents team on **0800 002 004**.

WHAT ABOUT EXISTING CULVERTS?

Many existing culverts were designed without fish passage in mind and others are no longer fish-friendly because they have deteriorated over time. Problems with small culverts can often be fixed with simple alterations.

These guidelines can help you fix existing culverts as well as build new ones.

MAINTENANCE

Culverts need to be regularly checked and maintained to make sure they work properly. You need to watch out for – and act on – any scouring of the stream bed and banks, blockages, structural damage and stream bed movement.

WHAT ABOUT EXISTING FLOODGATES?

If you have a floodgate, you would help fish passage by allowing a small continuous flow of water to go through the gate, by using flotation devices (e.g. ballcocks) or hinges that stop the gates closing completely.

Tips for fish-friendly culverts

REDUCING WATER SPEED

Fast-moving water will prevent fish swimming upstream through a culvert. You can slow down the water speed by:

- Choosing a stable site with a minimum stream bed slope
- Attaching objects such as rocks or small concrete blocks to the culvert bed. These increase the culvert's roughness, which can reduce water speed and provide resting areas for fish. Make sure the objects won't cause the culvert to become blocked by debris during floods)
- Placing a rock ramp below the culvert (see the Rock ramps section of these guidelines).

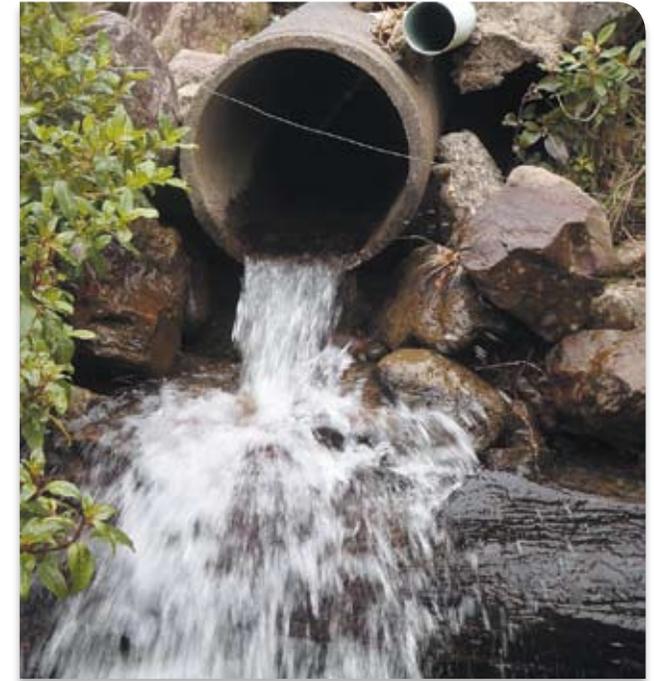
PREVENTING EROSION

Erosion of stream banks and stream beds can happen around culvert inlets and outlets.

Channel scour can result in hanging outlets – one of the most common barriers for fish in small streams.

To avoid hanging outlets and other erosion problems:

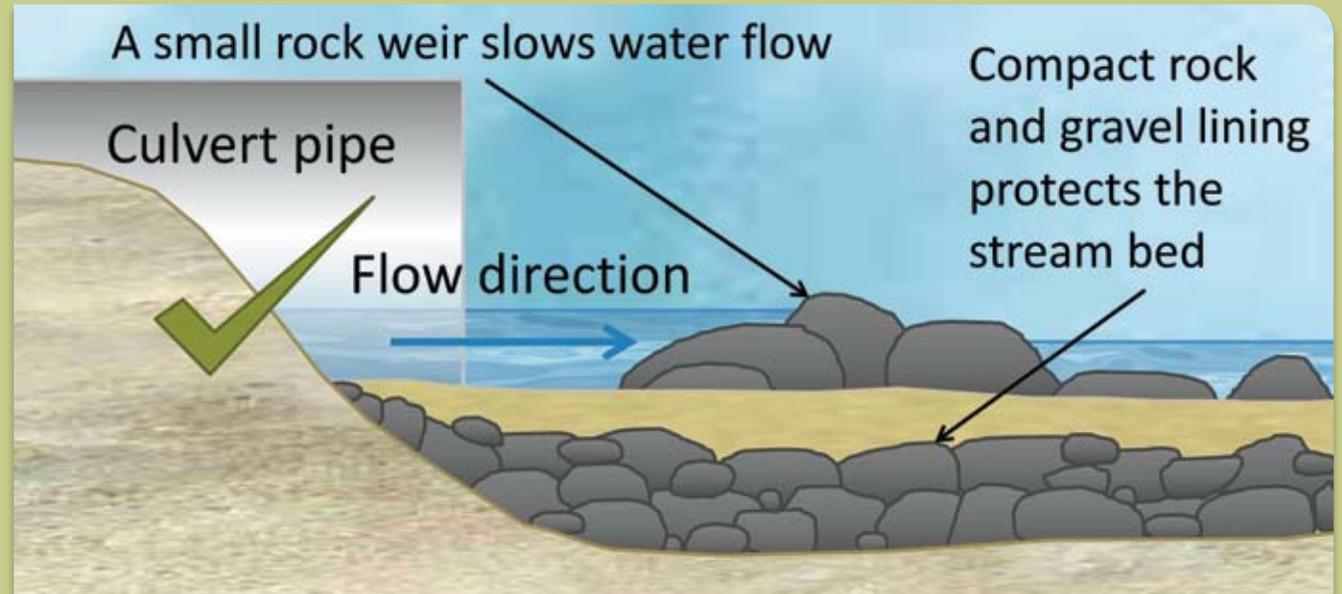
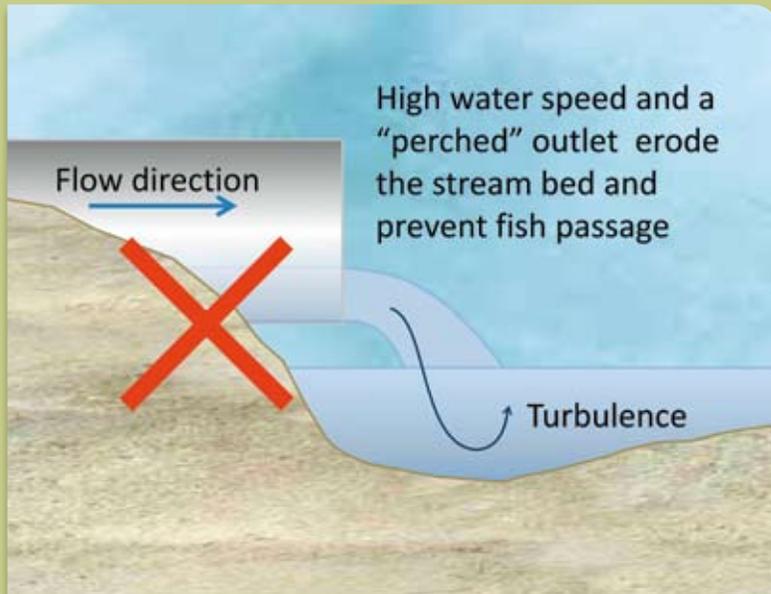
- Make sure your culvert is at least as wide as the stream bed during normal flows
- If erosion is likely, protect the stream banks and bed around both the inlet and outlet with rocks or other suitable material. A rock ramp placed below a culvert can also help prevent erosion.



Erosion can create hanging culverts – fish can't migrate up these

FIXING HANGING CULVERTS

The outlet of an existing culvert can be altered to make it fish-friendly, as shown in the diagrams below. Pre-fabricated fish ladders are also commercially available.

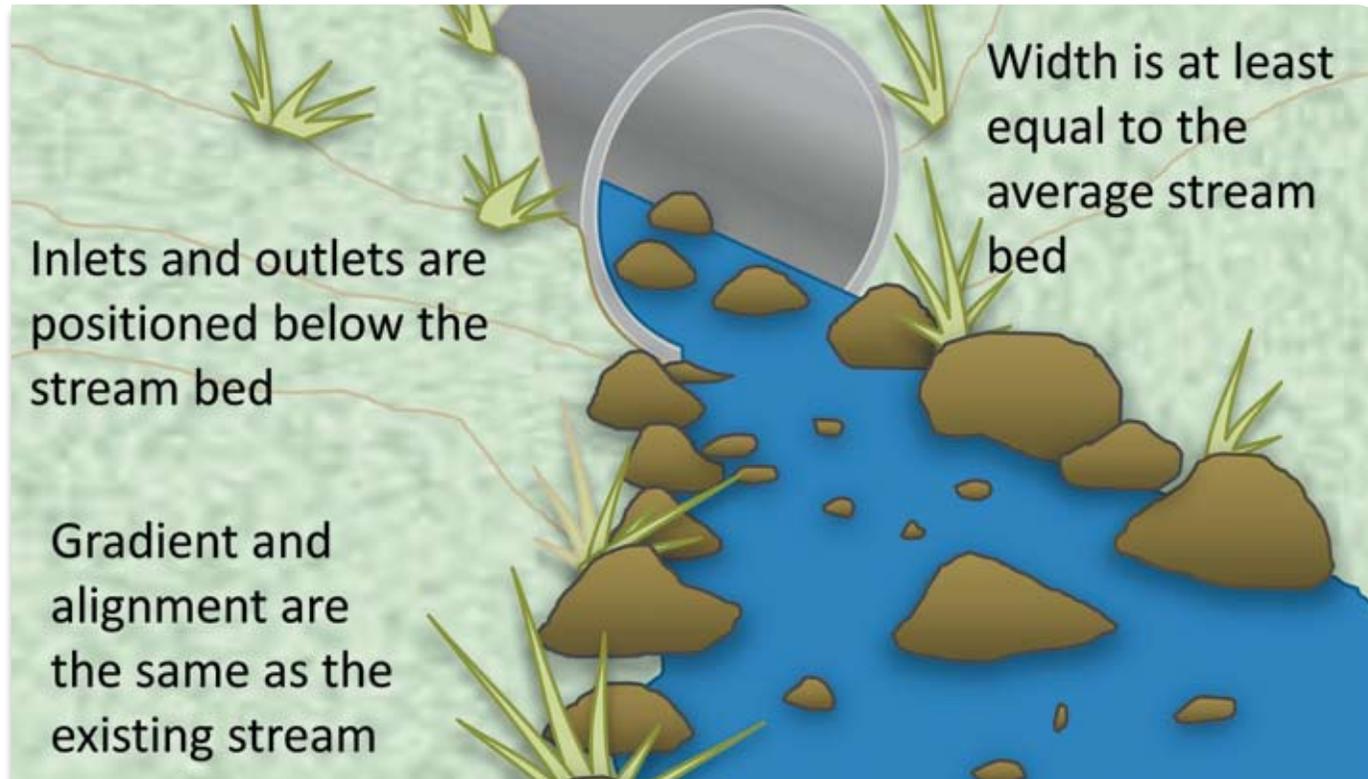


Fish-friendly culvert design

Northland's freshwater fish species all have different swimming and climbing abilities. The following two fish-friendly culvert designs will suit most of these fish and are simple to build.

The designs use pipe culverts, which are generally suitable for small streams. You will need to be sure that your culvert is large enough for flood flows as well as providing fish passage.

More complex culvert designs may be needed for specific circumstances – depending on location, the species involved and their swimming abilities. For more information, contact our consents team on **0800 002 004**.



THE 'LOW-SLOPE' CULVERT

'Low-slope' culverts are suitable if your stream is nearly level. They are suitable for all fish species.

With 'low-slope' culvert design:

- The culvert is as wide or wider than the stream bed
- The culvert aligns with the natural stream bed channel
- Water depth in the culvert is the same as in the natural stream bed
- Stream bed material is allowed to settle throughout the culvert's length
- If erosion is likely, the stream banks and bed around the inlet and/or outlet should be protected.

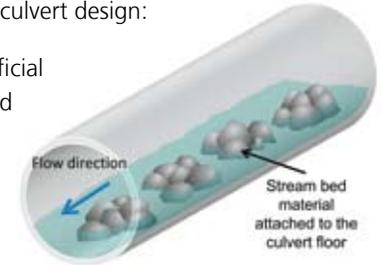
THE 'NATURAL STREAM BED' CULVERT

'Natural stream bed' culverts are suitable where the stream has a low to moderate slope.

Flow conditions inside them are similar to the natural stream, both upstream and downstream of the culverts.

With natural stream bed culvert design:

- Stones, rocks or artificial material are arranged and stuck to the culvert floor to simulate the stream bed
- The culvert is wider than the natural stream bed channel. You will need to be careful choosing the width of your culvert and the height of any fixed material in the culvert because flood flows must be able to pass through
- The culvert aligns with the natural stream bed channel
- The slope is the same as the natural stream bed slope
- You will need to consider protecting the stream banks and bed around the inlet and outlet as erosion is more likely than with the 'low slope' culvert.



You will need to check your natural stream bed culverts to make sure the simulated stream bed and the rest of the culvert are performing properly.

