

Works Within a Watercourse

Temporary Stream Diversion Design

When is a stream diversion needed?

Stream diversions are highly important controls for any works taking place in a watercourse. Stream diversions are needed to remove or decrease the risk of sediment entering the stream environment.

It is important that stream diversions are only temporary in nature as permanent diversions can impact upon the populations of macroinvertebrates and fish, which live in the stream.



Photo 1: Stream Diversion.

When constructed correctly, an efficient stream diversion as shown above can maintain the natural integrity of a stream while allowing a stable area for works to be completed.

Consent Requirements

If works within the stream do not meet the Permitted Activity requirements then a Land Use Consent: Works in a Watercourse is required. This consent is required under Chapter 7 of the Proposed Auckland Regional Plan: Air, Land and Water and Sections 13 and 14 of the Resource Management Act (1991). The temporary diversion of the stream is authorised under this consent.

Diversion Methods

Using a stream diversion as described in the method below can aid in a stable works area and help to avoid any damage to the stream environment. Efficient diversions allow for the construction of any controls in the original watercourse to be completed more quickly and to a better quality. A poorly constructed diversion (or worse, no diversion at all) can cause significant sediment discharges to the stream and cause the controls placed in the watercourse to be ineffective. Ultimately, this can lead to further damage and additional controls being required.

General Construction

- Ensure bed of diversion is stable and does not erode when utilised and line diversion banks with rip-rap to stabilise.
- Size diversion accordingly to stream flow and for any high flow events.
- Discharge diversion back into watercourse below works and at an area where erosion and scour will not occur, or stabilise discharge point.
- Keep gradient of diversion similar to that of stream to ensure inlet and outlet do not scour.
- Complete works as soon as possible so that diversion is only used for a short period.
- Clear works area of remaining water to a suitable sediment control once diversion is in place i.e. sediment retention pond.
- Work in dry weather to reduce risk of diversion failure.
- Construct dams from high quality materials to increase strength.

Maintenance and monitoring

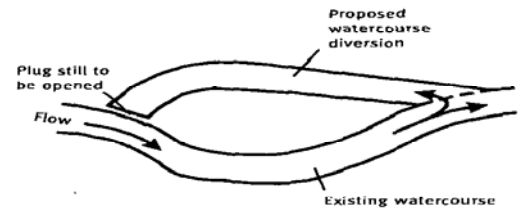
- Constant monitoring of the diversion is needed to ensure it is effective and does not cause sediment to enter the watercourse. This includes monitoring of the diversion liner.
- Care must be exercised to ensure that streamflow does not get under or behind the channel liner and cause erosion of the channel banks and subsequent downstream siltation.

How to create an effective stream diversion

The figure below shows suggested steps on how to create a stream diversion that will minimise sediment generation and discharge from a watercourse. Further information on stream diversions can be found in The Auckland Regional Council Technical Publication No. 90, *Erosion and Sediment Control, Guidelines for Land Disturbing Activities*.

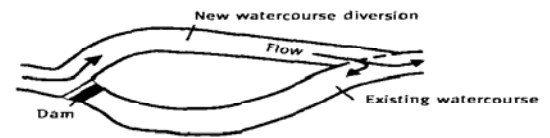
Step 1

Excavate the diversion channel leaving a plug at each end so that the watercourse does not breach the diversion. Size the diversion channel to allow for a 5% AEP rain event. Stabilise the diversion channel appropriately to ensure it does not become a source of sediment. Anchor suitable geotextile cloth in place to the manufacturer's specifications, which will include trenching into the top of both sides of the diversion channel to ensure that the fabric does not rip out. Open the downstream plug and allow water to flow up the channel, keeping some water within the channel to reduce problems when the upstream plug is excavated. Open the upstream plug and allow water to flow into the channel.



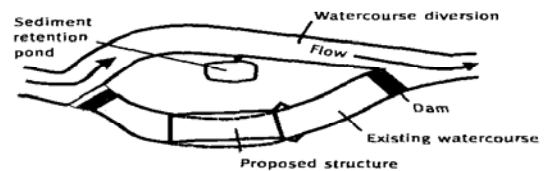
Step 2

Immediately place a non-erodible dam in the upstream end of the existing channel. Construct the dam as specified in Figure 3.2.2, where a compacted earth bund has shotcrete/ concrete placed, or appropriate geotextile pinned over it, with rock rip-rap extending over the upper face and adjacent to the lower face for scour protection.



Step 3

Immediately install a non-erodible downstream dam to prevent backflow into the construction area. Drain the existing watercourse by pumping to a Sediment Retention Pond where treatment of the ponded water can occur prior to re-entering the live section of the watercourse. Construct the structure and complete all channel work.



Step 4

Remove the downstream dam first, allowing water to flood back into the original channel. Remove the upstream dam and fill in both ends of the diversion channel with non-erodible material. Pump any sediment-laden water to a Sediment Retention Pond. Fill in the remainder of the diversion and stabilise.

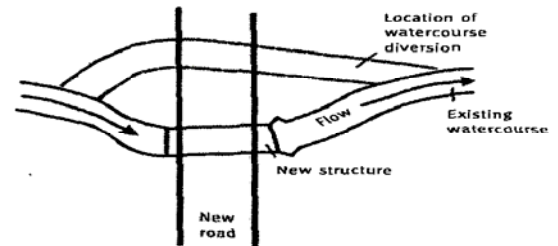


Figure 3.2.1 Temporary Watercourse Diversion Works Sequence

Further Information and References

The Auckland Regional Council has a number of technical publications relating to works within a watercourse including fish passage, sizing and design suggestions and appropriate models of stream diversions available for viewing at the Internet link: <http://www.arc.govt.nz/arc/about-arc/publications/> or for further information contact Enviroline or the Sediment Management Team on (09) 366 2000.

Note: this factsheet does not constitute ARC approval; other consents and mitigative strategies may be required. The proponent is advised to contact all other appropriate regulatory agencies, including their local council.