

Two-stage channel tipsheet

The two-stage channel is an agricultural waterway with floodplains created on either side of the central channel. More than 100 have been implemented worldwide and two-stages could offer multiple benefits to New Zealand waterways.

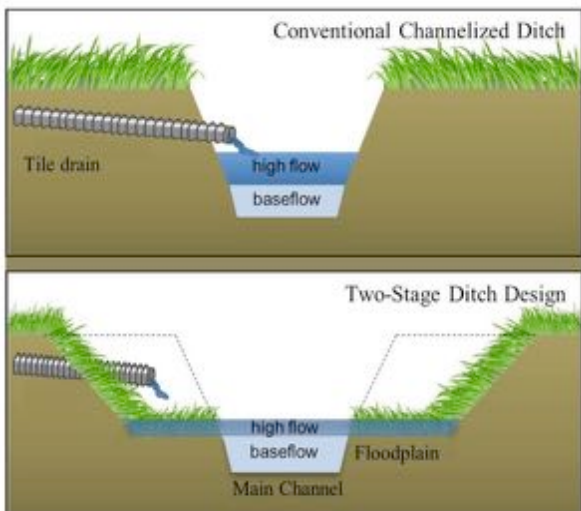
When floodwaters, drains and other surface flows are high, pollutants (nutrients, sediment, faecal coliforms) can settle out on the floodplain benches, preventing them from entering downstream waterbodies. In New Zealand, they have the potential to be implemented widely across dairy catchments to address a range of issues from flood capacity to water quality and biodiversity.

Five catchments nationally will be trialled using the method outlined here.

What are the issues?

How much buffer area available?

A minimum of 2 seasons (especially autumn/winter) of hydrologic flow data needed



Final design should accommodate approx. 9-14 flood events on bench per year (or 10-116 days flooding)

Two-stage construction in 2015 (Ashburton Forks)



1. Identify Issues & Set objectives

2. Collect baseline data

3. Site preparation

4. Implement monitoring locations

5. Analyse data to size channel

6. Finalise design

7. Construction

8. Monitoring (see options on p2)

9. Evaluation

Assess performance against objectives

Monitoring (before & after):

- Flow gauging
- Turbidity
- Biodiversity

Emerging technologies & opportunities:

- Nutrient sondes
- Soil organic matter
- Microbial contamination

New Zealand contexts:

- Pivot irrigation
- Spring-fed streams
- High-NO₃ in groundwater
- Narrow buffer widths
- Multiple ecosystem health issues & at varying spatial & temporal scales

NZ design options:

1. Plant with natives on benches - enhance nutrient cycling
2. Multiple tools - Intercept tile drain outlets with wetlands, sediment traps or bioreactors
3. Self-forming channel - Allow benches to form over time



Photo (left): In 2015, CAREX received IPENZ funding to implement a two-stage channel that was combined with native riparian planting on the benches, a sediment trap and in-stream bioreactor. The earthworks costed \$3000 and has provided useful demonstration value.

CAREX-DNZ expert workshop to identify:

- (1) Five national sites to be trialled
- (2) Considerations for site-selection
- (3) Combination of tools to enhance function and benefits
- (4) Catchment-scale modeling opportunities
- (5) Cost-benefit analyses

12-yr old two-stage channel (cropping farm, USA) No planting, maintenance, fencing required

