

Good wildlife ditch. © The Drainage Channel Biodiversity Manual:
Integrating Wildlife and Flood Risk Management (2008) Association of
Drainage Authorities and Natural England

Enhancing Drainage Ditches for Water Quality and Biodiversity

Ditches are unique engineered ecosystems with characteristics of streams and wetlands.

CAREX lessons learned – the ‘what’

1. Identify issues
2. Starting at the top
3. Fix leaky plumbing
4. Move downstream
5. Use a tool-box approach
6. Multiple tools for multiple problems



End of Tile Wetland

Advantages	Disadvantages
Low cost	Not suitable for high strength effluents
Easily implemented, can be constructed by landowner	
Easy and cheap to maintain	
Small land requirement	
Can be constructed quickly	
Can enhance biodiversity values	

End of Tile Drain



Nathan's Ditch Classification

Dry Ditch

- Dry except during and after rainfall events

Wet Ditch

- Stays wet year round
- Ground water table above the bottom of drain
- Very little water movement except during rain events

Stream Captured

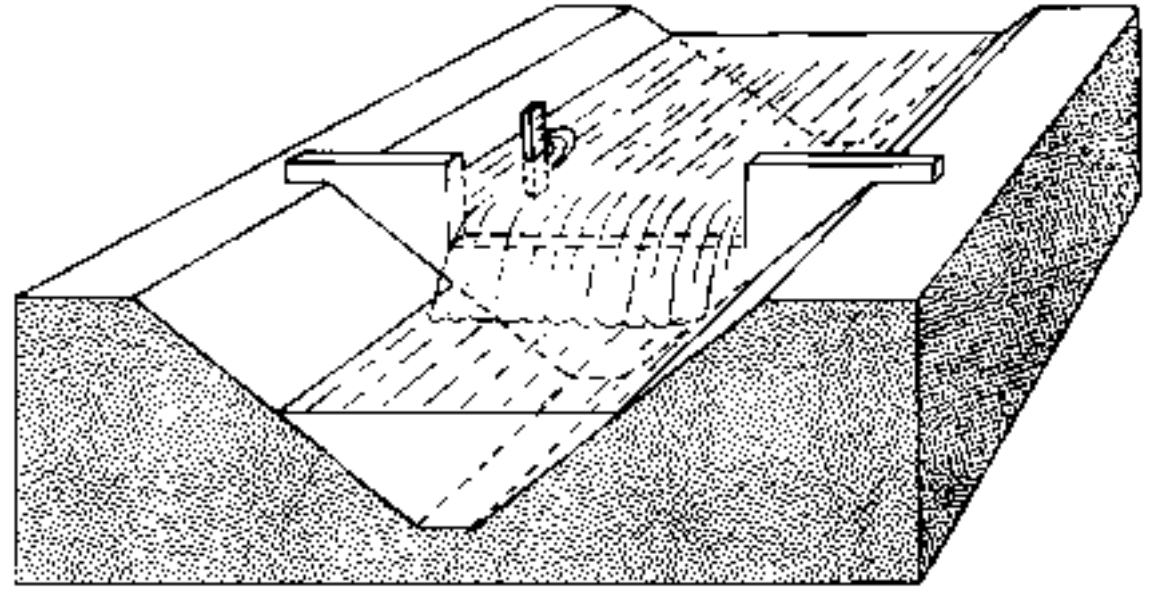
- Drainage ditch captures stream has flowing water
- Can include perennial and ephemeral streams

Drainage Ditch Water Quality Practices

Treatment	Dry Ditch	Wet Ditch	Stream Captured
Vegetated Ditches	X	X	
Grassed Waterways	X		
Re-Sloping Sides	X	X	X
Low Grade Weirs	X	X	X
In-Ditch Wetlands	X	X	X



Grassed Waterways



Low Grade Weirs



Rock Weirs

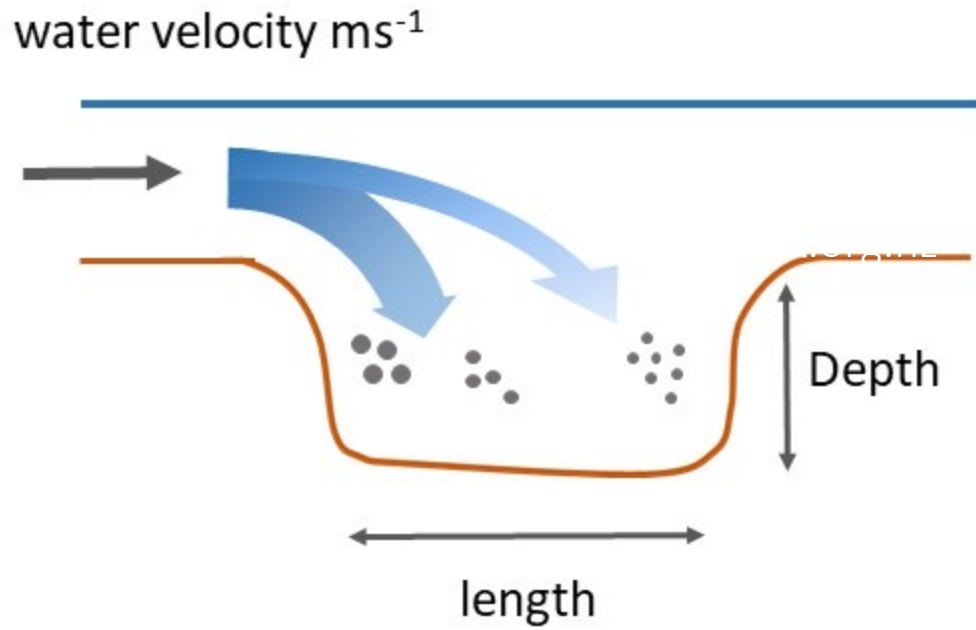
Costs

The 41 weirs installed in Windermere & Taylors

Drains required approximately 2 cubic metres of boulders each. In 2015 cost of boulder purchase and digger time per weir was around \$125.

“Rock Weirs: A Practical Option to Improve Instream Habitat” – Environment Canterbury, Fish & Game, & Ashburton District Council

Sediment trap design

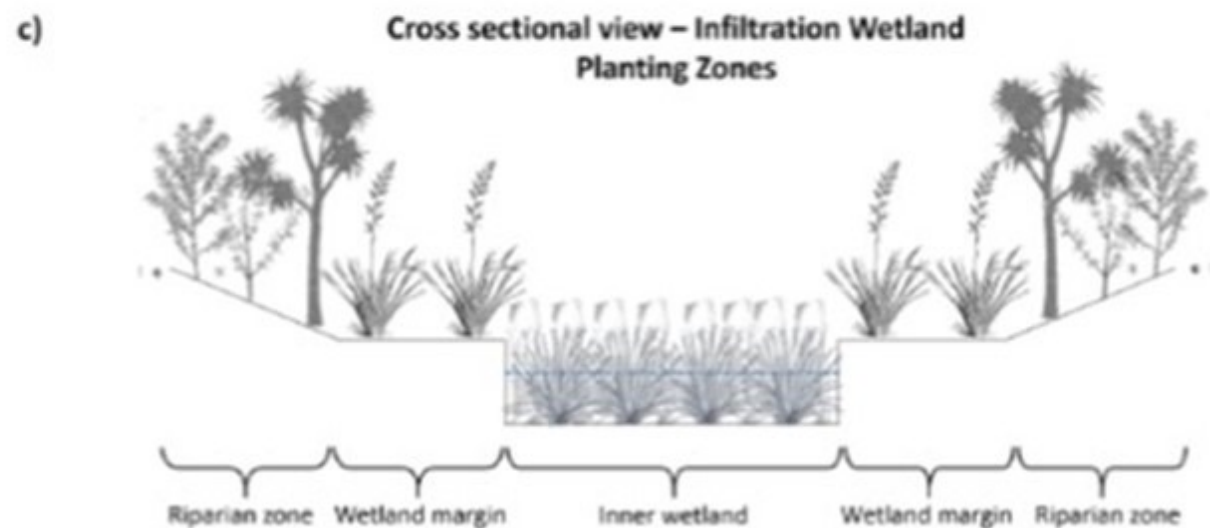
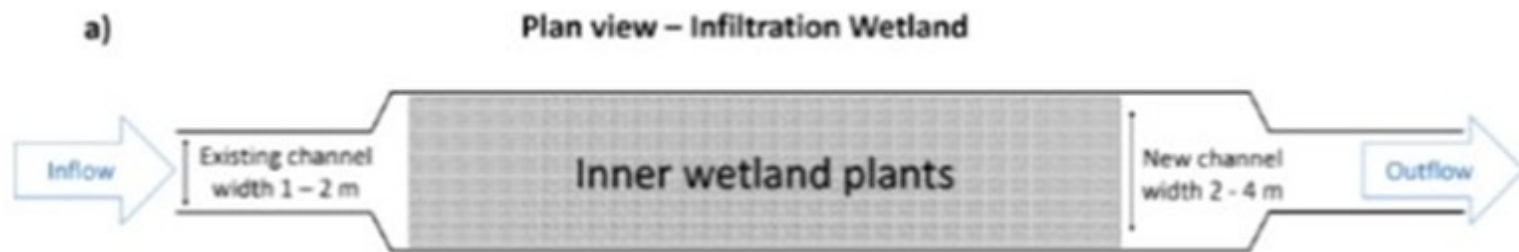


Larger sediments drop out first
Smaller sediments travel further

Suggested trap Length x Depth		Average width (m)		
		<1.5	1.5-3.0	3.0-4.5
Water velocity (ms^{-1})	<0.2	4.0 x 0.5	7.0 x 0.75	9.0 x 1.0
	0.2-0.4	7.0 x 0.5	10.0 x 0.75	12.0 x 1.0
	0.4-0.6	10.0 x 0.5	13.0 x 0.75	15.0 x 1.00

In-Ditch Wetlands

Advantages	Disadvantages
Low cost	Not suitable for high strength effluents
Easily implemented, can be constructed by landowner	Require regional council consent in drain management schemes
Easy and cheap to maintain	
Small land requirement	
Can be constructed quickly	
Can enhance biodiversity values	



In-Ditch Wetlands

Bank re-battering (re-shaping) reduces erosion
and bank collapse

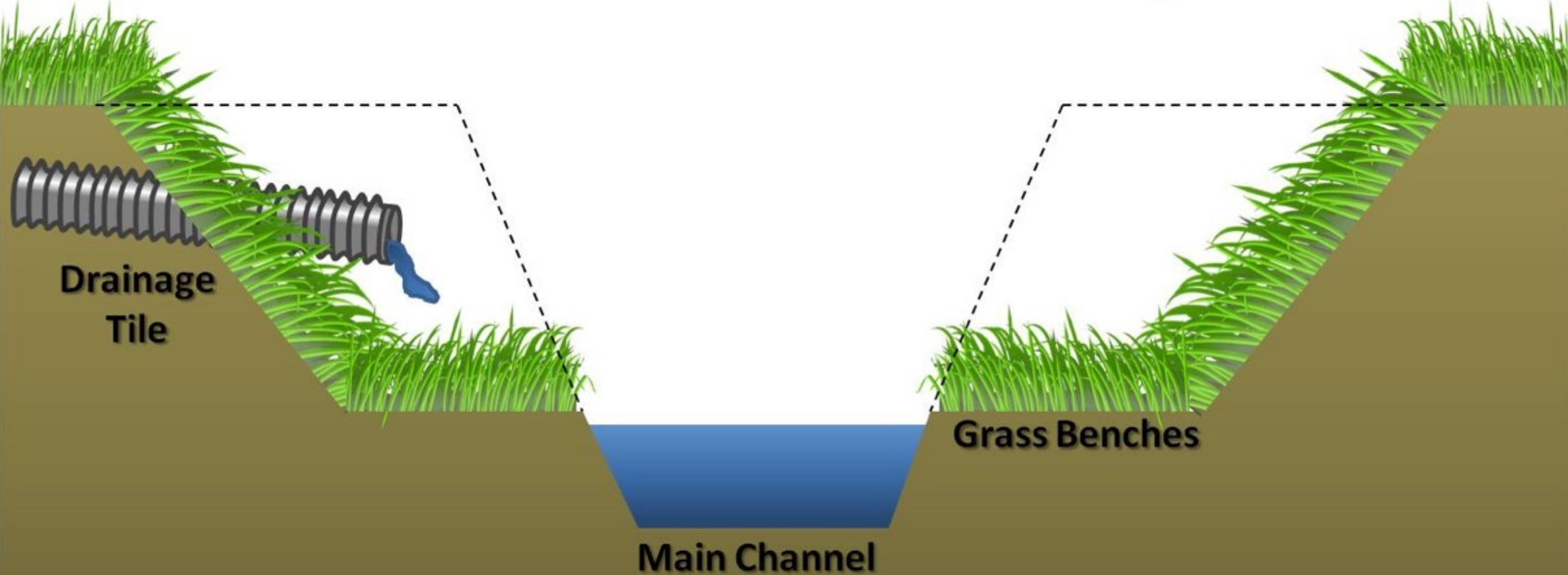
CAREX Canterbury Waterway
Rehabilitation Experiment



Carex secta along the water's edge stop nuisance weeds from establishing.

No drain maintenance has been required 3+ years since planting.

Two-Stage Ditch Design





Case Studies



Napier



Waikato – Dairy Farm

Emergency Overflow

Increased drain width
with deep center

Wide drain channel with
minimal slope and part of
the wetland

Wetland basin









Dry Stock Farm – Central Hawke's Bay







Dairy Farm – Central Hawke's Bay



Drain widened, re-battered, and a shallow water shelf for planting aquatic plants

Grade Control Structures

Wetland Basins



Drain # 3









Hawthorn hedge (bank collapse, erosion), aquatic weeds, regular drain clearance



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WORKING TOGETHER TO CARE
FOR NEW ZEALAND'S WATERWAYS

Headwater waterway



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Riparian planting with local, eco-sourced native plants



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Widened riparian on one side – planting on North side



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Silverstream (2017)



LIVING

WATER



Potential Wetland Sites



Potential Sites

- Re-Battering
- Two –Stage Ditch Design



Potential Sites

- Two-Stage Ditch Design
- In-Ditch Wetland

