



WETLANDS ON THE FARM

Wetlands improve the quality of the water that passes through them – they are often referred to as the kidneys of the environment.

They can:

Reduce suspended solids – by slowing water velocities solids are able to settle in the deep wide areas of a wetland.

Reduce nitrogen – microbes in the wetland sediments attach to live and dead plants below the water and can convert dissolved nitrate to nitrogen gas. Nitrogen gas makes up around 80% of the atmosphere and is harmless.

Reduce phosphorus – phosphorus is taken up by wetland plants and can then be buried in the sediments. Phosphorus can also be adsorbed to the wetland sediments.

Reduce harmful microbes and pathogens – sunlight is an important sanitizer, killing harmful microbes. Competition and predation by beneficial microbes also reduce the number of harmful microbes.

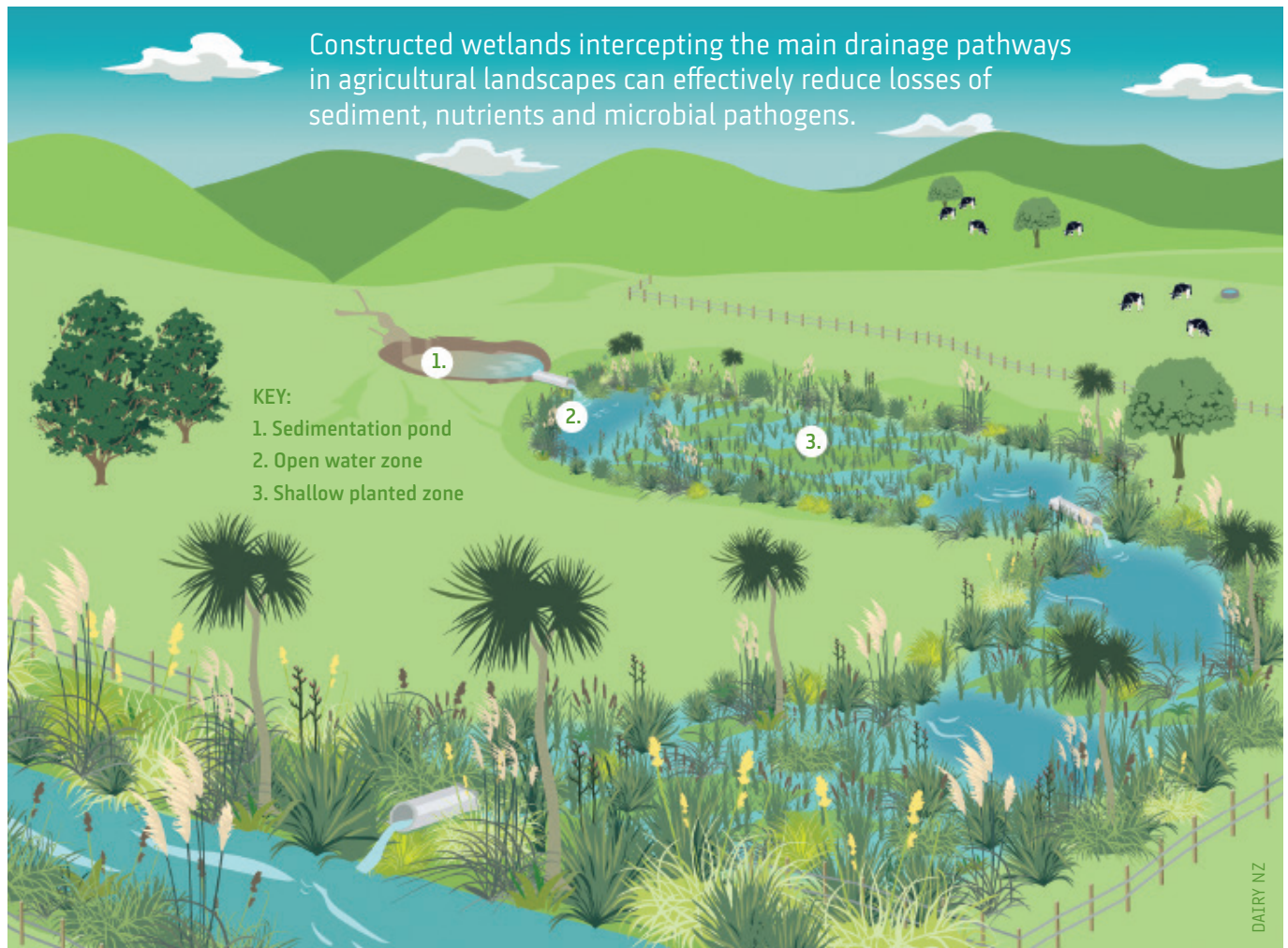
Other benefits

Carbon sequestration (storage) – wetlands can capture and store large amounts of carbon. This assists the environment by counteracting the addition of greenhouse gases to the atmosphere caused by the burning of fossil fuels and farming of ruminant livestock.

Biodiversity – wetlands provide a range of habitats for native species, including plants, birds, fish and insects.

Aesthetic – natural wetlands often have many features which are attractive. These include open water areas, diverse plant and animal assemblages, and native trees.

CONSTRUCTED WETLANDS



With the many benefits that natural wetlands provide, many people are looking to either restore damaged wetlands or construct artificial wetlands to perform these functions. Increasingly constructed wetlands are being developed so that they look and function in very similar ways to natural wetlands. Features might include a range of deeper and shallower areas for capturing suspended solids and supporting a wider range of plant species, curved natural shapes, and wetlands in a series of discrete but natural looking cells.

Constructed wetland performance depends factors such as: Does the wetland intercept hot-spots of contaminated flow, and is it large enough for the flows entering it? Also, wetlands with multiple cells, well established plants and a good distribution of flow result in higher levels of performance.



Constructed wetlands are typically planted with native plant species.



Curving shapes and amenity plantings of native trees results in a natural appearance.

You can find out more about constructing wetlands for treating tile drainage at

<https://niwa.co.nz/tilde-drain-wetland-guidelines>

Updated NIWA/DairyNZ constructed wetland guidelines for other types of agricultural runoff (still in development) are available at:

<https://niwa.co.nz/freshwater-and-estuaries/management-tools/constructed-wetland-guidelines>

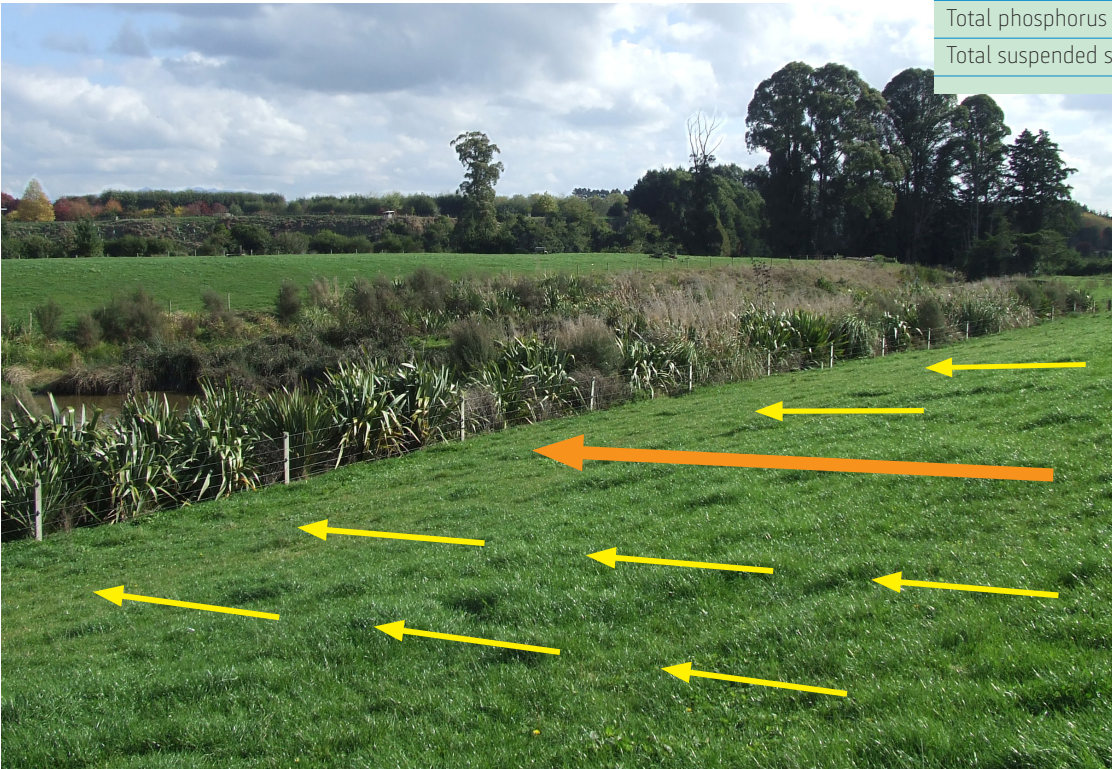


OWL FARM CONSTRUCTED WETLAND CAMBRIDGE, WAIKATO

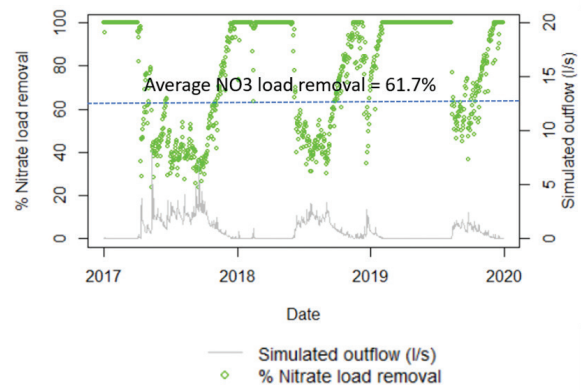
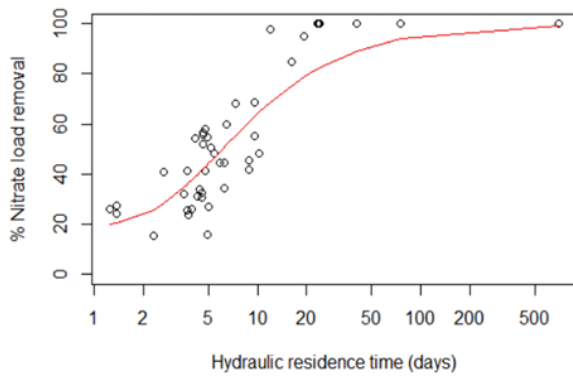
The wetland receives farm drainage water from a single tile drain plus natural groundwater seepage.

Wetland area: 3400 m² (4.5% of catchment).
Catchment area 7.6 ha.
Wetland constructed in 4 cells in 2016.

Summary of Owl Farm Constructed Wetland performance	
	% load reduction
Nitrate	62%
Total nitrogen	49%
Total phosphorus	15%
Total suspended solids	45%



Nitrogen enters mainly as nitrate in groundwater seepage and tile drainage. While plants do take up some nitrate, removal occurs mainly by the action of microbes in the flooded soils and plant litter of the wetland.



Treatment performance at Owl Farm

Nitrogen removal performance is dependant on how long water stays in the wetland. So larger wetlands work better. Normally this requires wetland areas of somewhere between 1 and 5% of the contributing catchment). Above you can see the nitrate removal performance measured at Owl Farm from 2017 until the beginning of 2020.

During higher flow periods the residence time of water in the wetland diminishes reducing the removal of nitrate. Nitrate removal is also slower in the colder winter months when microbial activity and plant uptake is reduced.



The Owl Farm wetland contains a mixture of native wetland plant species such as raupo, kuta, pukio, umbrella sedge and kuawa, all surrounded by native shrubs and trees. The wetland is showing high levels of nitrate removal and other forms of nitrogen, along with good removal of incoming suspended solids and phosphorus.