Drainage

Drainage is essential

Good drainage systems quickly remove excess surface and sub-surface water from the paddock. An effective drainage system will remove excess soil water within 24 hours of the rainfall event. A good time to assess the needs on your farm is after a heavy rain event when problems with ponding and runoff are easy to see.

There are a number of options available to improve drainage, including:

- re-shaping the layout or contour of the paddock
- improving surface drainage to remove surface water quickly from cropped areas
- installing subsurface drainage to remove water from saturated soils by downward flow.

Planning

A farm drainage system requires careful planning to optimise the capital expenditure. A successful scheme will considers these factors:

1. What is causing the water-logging problem? Is it from surface or subsurface water or both? Where is the water coming from?
2. What is the frequency and duration of water-logging and how big is the affected area? Is remediation a priority for on-going profitability?
3. Is there sufficient outfall available? Water needs to be drained away to somewhere else, preferably by gravitational flow, otherwise it becomes a costly exercise involving pumps. Are the outfall drains well maintained and deep enough to remove water quickly?
4. What are the likely benefits? Will the cost of the drainage scheme be returned through increased productivity and how long will it take?
5. Which areas should be drained first? Efficiency and cost savings can be gained by considering the drainage plan for the whole farm and working out which part should be tackled first.
6. What type of drainage system is required?
7. Do I need assistance to develop a plan?

Reshaping

Other options include ensuring surface contour allows effective water movement. Precision land levelling is useful in removing depressions in paddocks where ponding is a problem. Bunded headlands can prevent water flowing into the crop and cultivation methods such as furrow diking reduce run-off by slowing the water movement along wheel tracks.

Precision levelling using high accuracy GPS

Surface drains

Surface drains are useful for intercepting run-off from neighbouring higher areas and draining surface water off the land quickly. They also collect water from sub-surface drains. Surface drains include ditches, drains and grassed waterways. They must be regularly maintained to keep them flowing and may be a hazard for machinery and animals. Care must be taken to prevent bank erosion and damage from stock access.

Subsurface drains

Subsurface drains remove excess water from the soil profile via networks of perforated plastic tubes, (tile-drains) or unlined channels (mole-drains), installed below the soil surface. Water drains into the tubes or channels and flows away to a surface drain.

Mole drains can only be made in heavy soils with a clay sub-soil. Long lasting channels need a clay content of 30-35%. They are made by pulling a ripper blade or mole plough through the subsoil and rely on the soil structure to support and keep the channel open. Ideally the soil should be free of stones at the mole drain depth.

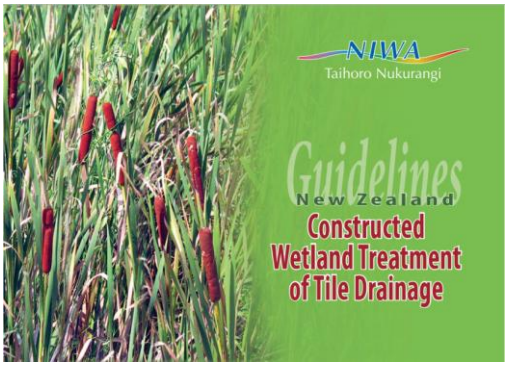
Use an experienced drainage contractor to assist with the development of your drainage plan.

Installing sub-surface drainage with gravel envelope

Environmental concerns

Drainage has both positive and negative effects on water quality. In general, land with good sub-surface drainage has less surface run-off, erosion, and phosphorus loss than land that has no drainage improvements or only surface drainage. However sub-surface drainage is a significant route for water soluble nutrients like nitrates to reach fresh water.

Wetlands are an important part of a drainage system. They have a role in regulating water flow and maintaining water quality, as well as providing habitat for water-based wildlife.



Constructed wetlands are a simple, practical tool farmers can use to intercept tile drainage water to reduce nutrient losses.

NIWA's publication; The New Zealand Guidelines for Constructed Wetland Treatment of Tile Drainage, guides farmers on how to develop an effective wetland on their farm and provides guidance on wetland planting, weed control and maintenance.

http://www.niwa.co.nz/our-science/freshwater/tools/tile-drain-wetland-guidelines