Cultivation and cropping in Northland and Auckland

A land management guide for dairy farmers – valuing and looking after your soil
It is important to look after soil for many reasons. Not only does it play an important part in production, losing soil has a high cost if seed and fertiliser is washed away. Regional councils are putting emphasis on soil management as it has a significant effect on water quality and contributes to the protection of Auckland and Northland’s rivers, harbours and estuaries.

**How to use this guide**

There are a few steps you can take on your farm to help reduce soil loss when cultivating. Use the paddock assessment tool at the back of the guide to identify risk areas in cropping paddocks. The information in this guide will help you to manage these risk areas, minimise damage to paddocks and reduce runoff.

**Before you start ...**

**Know your soils**

In order to appropriately manage soils, it is important to recognise what soils you have within your paddock and the properties of these soils. For some soils, poor management over short periods can have long-term environmental and productivity implications. Know your soil types as accurately as possible and work to the riskiest soil type within the paddock.

In Northland and Auckland, soils can generally be grouped into one of three categories based on dominant particle size; clay, silt and sand dominant soils. Each has different levels of risk, as explained below.

<table>
<thead>
<tr>
<th>Soil property</th>
<th>Clay dominant soils (Very small – small particle size)</th>
<th>Silt dominant soils (Small – medium particle size)</th>
<th>Sand dominant soils (Medium – large particle size)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water runoff risk</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Compaction risk</td>
<td>High</td>
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</tr>
<tr>
<td>P loss with soil risk</td>
<td>High</td>
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<td>Wind erosion risk</td>
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Inappropriate cultivation methods applied over any soil type can destroy soil structure, limit productivity and increase erosion, so knowing the capabilities and limitations of your soils is key to producing sustainably. Contact one of your local regional council staff or your farm consultant to discuss your property’s soil types and appropriate management strategies.

**Know where soil is being lost**

- In intense rain events, a large amount of bare soil can be lost in a short period.
- When it is raining, have a look at your paddocks, races and streams. Watch where water is flowing and find out if there is sediment moving into the stream.
- Which paddocks are at the most risk of runoff? Which paddocks are the most erosion prone?
- Races, bridges and culverts also tend to be areas with high runoff.

**TIP**

Clay dominant soils are particularly at risk of damage from cultivation. Consider minimum tillage practices such as direct drilling.
**Erosion basics**

*What is happening?*

Raindrops cause detachment of soil particles which can lead to rilling and then to gully erosion. This results in losing valuable topsoil from where it’s needed and a build up of soil where it’s not wanted. To reduce erosion, the length of slope that water can flow down must be reduced and the movement of water slowed down.

Erosion can occur on any sloping surface, particularly where the soil is exposed. Sheet erosion will remain relatively unseen. Gully erosion is usually very active but can also start as tunnels under the surface.

*Actions to avoid or minimise erosion when cropping*

- Don’t cultivate right up to a waterway. Maintain a buffer and check with your regional council about any requirements they may have.
- Select cropping paddocks carefully, limiting cropping on steep slopes and critical source areas.
- Consider minimum tillage practices e.g. direct drilling.
- Avoid overgrazing of crops.
- Install sediment traps at the bottom of slopes and redistribute nutrient-rich deposits over the paddock it came from.
- Minimise the amount of time that soil is bare by using cover crops or re-establishing pasture as soon as possible.
On a dairy farm most soil and phosphorus is lost from relatively small areas – referred to as critical source areas (CSAs). Managing these areas to reduce overland flow is one of the best ways to reduce soil and nutrient losses.

**What are Critical Source Areas?**

CSAs are low-lying parts of farms such as gullies and swales that act as highways for overland flow of water, transporting soil and phosphorus to waterways. Boggy areas within paddocks are CSAs as they accumulate sediment and become a hotspot.

The first step to reducing contaminant loss is to identify the CSAs on your farm. These areas should be managed carefully to reduce the amount of soil and nutrients lost to waterways.

If CSAs have subsurface drainage underneath, contaminants have a direct route to waterways.

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**TIP**

Before you cultivate, walk your paddock and identify overland flow paths and soil loss hotspots. Use the paddock assessment tool at the back of this resource to identify risk areas.

For farms in the Auckland region, overland flow paths can also be found on Auckland Council’s GIS viewer - GeoMaps.

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**Actions for managing critical source areas**

- Identify where CSAs are in your paddock.
- Avoid cultivating CSAs and leave a grass buffer zone to filter contaminants and prevent stock access. The faster the water is flowing, the wider the buffer zone should be to provide for effective filtering.
- Graze CSAs last if you do not want to permanently fence them off.
- When installing new subsurface drainage, direct them into areas where runoff can be filtered, such as wetlands or grass buffers, before entering waterways.

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**An example of a CSA. It collects a lot of runoff from the surrounding paddocks, is boggy, unproductive and causes problems. The CSA is going to be fenced off and left with rank grass to slow and filter runoff coming off the paddock.**
**Good practice cropping**

### Selecting crop paddocks

Many paddocks have challenging features which can increase the risk of contaminant loss, such as slopes or waterways. Paddock selection should consider the environmental risks and how these will be minimised. If the risks are too great or cannot be minimised, a different paddock should be considered.

### Crop paddock selection to minimise losses

- Identify where critical source areas (CSAs) (gullies, boggy areas and drains) are in your crop paddocks.
- Select paddocks with fewer CSAs which will be easier to manage. If there are CSAs in the paddock leave a grass strip uncultivated in and around them to filter contaminants before they reach the wet area.
- Select paddocks that are a greater distance from waterways to increase the chance of contaminants being filtered before reaching the water.
- Select paddocks with soils less susceptible to pugging or compaction.

### Actions for cultivation

- When establishing a crop, use minimum tillage or direct drill to reduce soil disturbance.
- Keep the number of runs over a paddock to a minimum and keep to the same wheel tracks as the previous runs.
- When it is safe to do so, it is good practice to cultivate across slopes rather than up and down, which can speed up overland flow.
- Grass strips left across slopes of cultivated paddocks will act as a filter to trap sediment running off cultivated areas.
- Understand where water flows in a paddock during wet periods. Avoid cultivation in CSAs such as seeps, gullies and dry streambeds, to minimise soil loss.

### TIP

Winter cropping in Northland and Auckland leads to an increased environmental risk and long term soil damage. If you are considering winter cropping, consult with experts about the best way to go about it.

**Figure 1.** Cultivate across slopes where possible to reduce soil loss by redirecting water flows. Leaving grass strips will provide a filter and slow water movement.
**Filtering overland flow**

Buffer zones or grass strips in and around CSAs and next to waterways and drains act as filters by slowing overland flow to trap suspended contaminants. The buffer zone should be left uncultivated and ungrazed to operate effectively. The faster the water is flowing the wider the buffer zone will need to be to provide time for effective filtering. This is particularly important on sloping land or in a CSA.

**Sediment traps**

Sediment traps reduce the build-up of silt, sand and gravel downstream. They work by slowing flows, reducing energy, filtering sediment and allowing grass growth. The trap has to be emptied when it fills up, but it will reduce the need for more extensive waterway clearing. Reduced sedimentation of waterways can also reduce the growth of weeds that choke channels.

**Grazing crops**

TIP: Seek advice from your regional council regarding consent requirements and permitted activity rules for cultivation. Obtain all the necessary consents prior to any physical work.

TIP: Portable troughs can make grazing of crops easier and can also reduce soil damage around troughs.
Which paddocks are at the most risk of runoff? Which paddocks are.

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Effect on water quality and contributes to the protection of Auckland and Northland's rivers, harbours and estuaries.

Before you start …

Watch where water is flowing and find out if there is sediment moving into the stream.

Erosion basics

• Install sediment traps at the bottom of slopes and redistribute nutrient-rich deposits over the

• Consider minimum tillage practices e.g. direct drilling.

• Select cropping paddocks carefully, limiting cropping on steep slopes and critical source areas.

What is happening?

Erosion can occur on any sloping surface, particularly where the soil is exposed. Sheet erosion will remain relatively

short period.

TIP

Clay dominant soils

(Very small – small particle size)

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Minimum tillage practices

Clay dominant soils

(TIP)

Sand dominant soils

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Particle size

Soil property

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Tool at the back of the guide to identify risk areas in cropping paddocks. The information in this guide will help you to

How to use this guide

Wind erosion risk

P loss with soil risk

Compaction risk

Surface Water runoff risk

Particle size

Soil property

Step 1: Draw an outline of the paddock

Symbol or Complete (tick)

Note map direction

Mark on obvious features

Step 2: Identify risk areas/paddock features

Symbol or Complete (tick)

Slope (direction and steepness)

Soil type

Soil loss hotspot

Waterways and wetlands

Gateways

Troughs

Step 3: Plan

Symbol or Complete (tick)

Direction of cultivation

Direction of grazing

CSA to be strategically grazed

Buffer zones

Sediment control measures

Where water is coming from

Where water is going to

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# Paddock assessment and cultivation plan

**Farm name:** ___________________________  **Paddock:** _______  **Date:** ____________

## Step 1: Draw an outline of the paddock

- Note map direction
- Mark on obvious features

## Step 2: Identify risk areas/paddock features

- Slope (direction and steepness)
- Soil type
- Soil loss hotspot
- Waterways and wetlands
- Gateways
- Troughs

## Step 3: Plan

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