

Guidelines for the use of setbacks on arable farms

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ADDING VALUE TO THE BUSINESS OF CROPPING



Project partners

- FAR
- MPI Sustainable Farming Fund
- Plant & Food Research
- Environment Canterbury
- Project Manager: Colin Hurst



Ministry for Primary Industries
Manatū Ahu Matua



Project aims

For arable farms:

- Quantify sediment loss.
- How important is the width of setbacks?
- Identify circumstances that trigger runoff events.
- Develop guidelines.



Overflow water from the defined boxed area and goes to the cemented gutter.



Water that ends up in the gutter gets channelled into the primary settling bucket (PSB).

Inside the primary settling bucket there are two flow switches which control the pump.

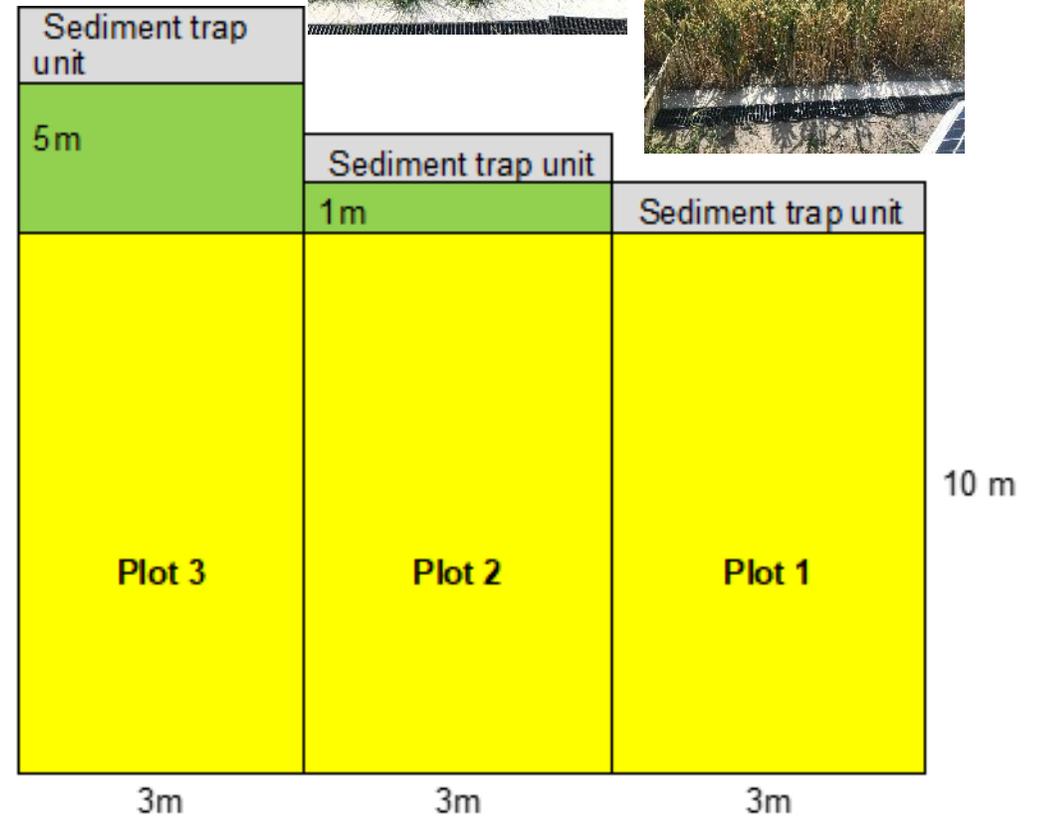
When activated water gets pumped out through the piping.





Established setback

Grower's crop



Quantify sediment loss

- Most runoff studies have been conducted below pasture, with few studies on cultivated land.
- Modelling work in NZ has shown annual yields to typically range from 400-4000 kg/ha/yr.
- Runoff is not a problem in all years/on all farms, i.e. North Island site. Low rainfall, negligible runoff.
- Results for Sth sites averaged <200 kg/ha/yr.
- At one site most of this was from one event.

Quantify sediment loss

- Record-breaking rainfall event on 10 August 2019 at Waimate.
- Often, majority of runoff is from just a few major events.
- Some events are beyond our control.



Width

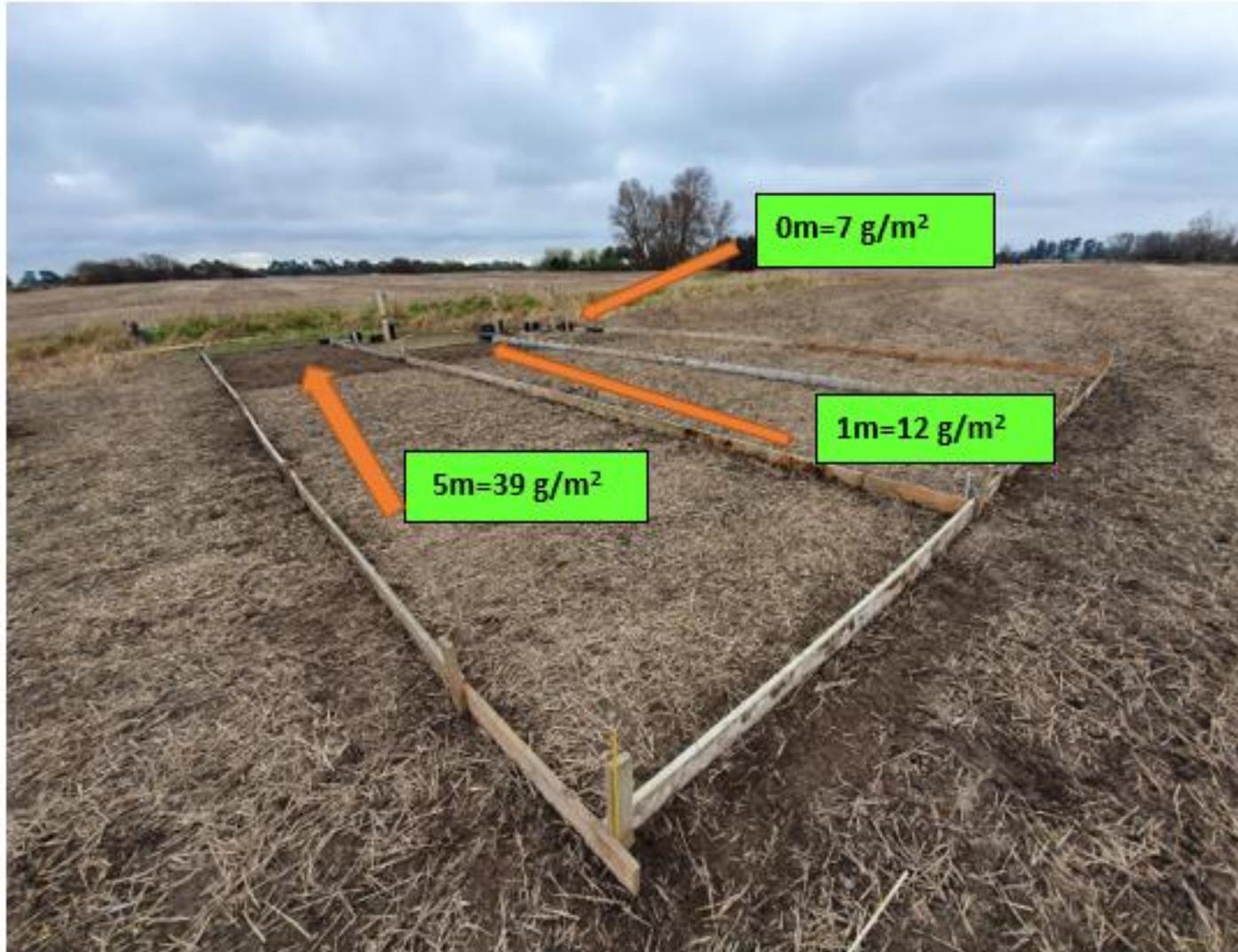
40% reduction



60% reduction



Bare ground



Factors that triggered events

- Slope (length and grade)
- **Soil vegetation cover**
- Intensity and volume of rain
- Soil physical properties - **compaction, infiltration rate**
- Management choices
 - Tillage choices
 - Grazing strategies

Of the factors known to influence runoff; minimising fallows, retaining residue and managing compaction and infiltration rates (soil quality) were found to be the most important.

Blanket rules - not the answer!

- These data show that in some area's runoff may not be a high risk.
- Where runoff is a risk, setbacks will work best if they are included in a flexible approach= better outcomes for farm/environment.
- The biggest environmental losses may come from a small proportion of the farm.

What is the answer then?



Farmer's knowledge and experience of their land

Carey Barnett, Leeston cropping farmer:

“Blanket rules can be ineffective and it is important that the regional rules have the flexibility to enable farmers to design effective setback systems and mitigations to match the physical characteristics of their farms”.

- Risk assessment is the place to start.
- Understand how in paddock management decisions impact soil quality (residue management, minimising fallows and compaction).

Active vs passive

A critical source area (CSA) is anywhere on a farm contributing a disproportionately large amount of contaminants to the environment.

Risk areas can be:

- Active/fixed i.e. preferential pathways of overland flow – CSA.
- Passive (areas that are not fixed geographically e.g. the location may vary depending on phases of the rotation).

diversion bund

earth bund

contour

interception

sediment trap

setback

benched headland

silt fence

access way placement

culvert

retention pond

crop build
organic matter cover
residues infiltration
root
restorative



What to plant

The greatest reductions in flow velocities are achieved by vegetation that:

- Is uniformly dense at ground level.
- Has a strong root system.

All common pasture grass species (rye grass, timothy grass, fescue, cocksfoot) as well as non-legume broad leaf pasture species may be potentially suitable for setbacks.

Placement and width

- Setbacks need to be established at points where overland flow enters the stream.
- Locations with typically high loads of sediment, either because of slope or position may require wider setbacks (i.e. >3 m).
- In areas where little or no overland flow enters the channel, such as where there are natural /bunds levees, no setback may be required.

Management

- Need to be maintained in order to keep functioning effectively.
- Occasional slashing is important to keep a uniform dense grass cover in non-grazed areas.
- Control weed growth as weeds compete and don't provide a good filter (as near ground plant density not as high).
- Preferential channelisation can be a problem- setbacks need regular inspection.

Other resources

- *Erosion & Sediment Control Guidelines for Vegetable Production* prepared for Horticulture NZ by Andrew Barber www.vri.org.nz
- *Don't Muddy the Water* app quantifies sediment loss with and without mitigation measures.
- A Vegetated Buffer Strips Guide soon to be accessible on the VR&I website.
- Physiographics website - LandscapeDNA landscapedna.org

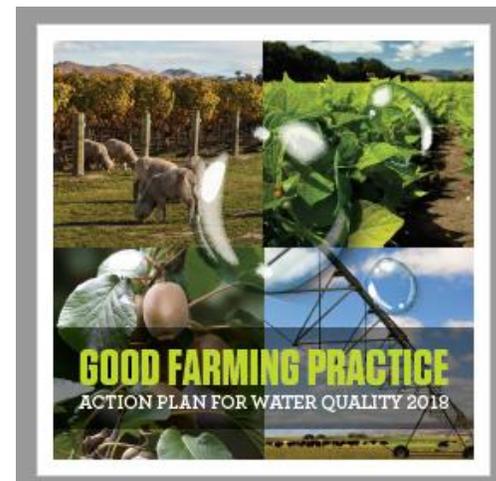


Productive riparian buffers

Literature review

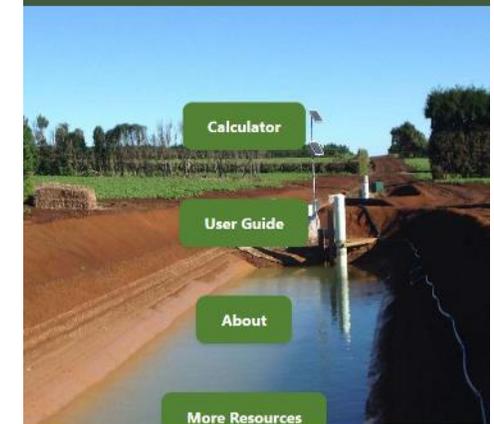
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Don't Muddy the Water

Erosion and Sediment Rate Calculator



Farm Environment Plans

- In paddock good management practices are key - keep the soil in the paddock.
- Efforts can be included in FEP - demonstrate understanding.

Questions?

