



**PROTECTING
SHARED
WATERS**



PEACEPLUS

Northern Ireland - Ireland

Co-funded by the



European Union



UK Government



Rialtas na hÉireann
Government of Ireland



Northern Ireland
Executive

CASE STUDY
07

Magic Margins (Micro-dams)

Modified field margins that slow surface runoff, trap sediment, and filter nutrients before they reach watercourses.

Overview

Magic margins are a type of '3D' buffer strip along field edges, constructed with ridges and small dams to intercept, slow, and filter surface runoff on sloping farmland. Vegetation sustains the structure of the margin, while also enhancing infiltration, absorbing nutrients, and supporting biodiversity.

Primary Function

Reduce runoff velocity and erosion, trapping sediment and nutrients before they leave the field and enter watercourses.

Location Considerations

- > Best suited to sloping fields with diffuse runoff and moderate erosion risk.¹
- > Not suitable for convergent flow pathways, where alternative measures are more effective.
- > Should be located perpendicular to slope direction to maximise interception.¹
- > Can be integrated into existing buffer strips (e.g. ~5m) to enhance runoff management.²
- > On poorly-draining soils (e.g., clays), magic margins can cause water to pond behind the ridges.

How They Work

1. Runoff Interception

Ridges constructed across the slope intercept overland flow and reduce its velocity.

2. Temporary Storage

Small dams between ridges hold back water, allowing time for infiltration into the soil.

3. Sediment and Nutrient Retention

Reduced flow encourages deposition of sediment and associated nutrients within the margin, preventing downstream losses.

4. Vegetation Filtration

Vegetation stabilises the structure, filters pollutants, enhances nutrient uptake, and provides resources for pollinators.

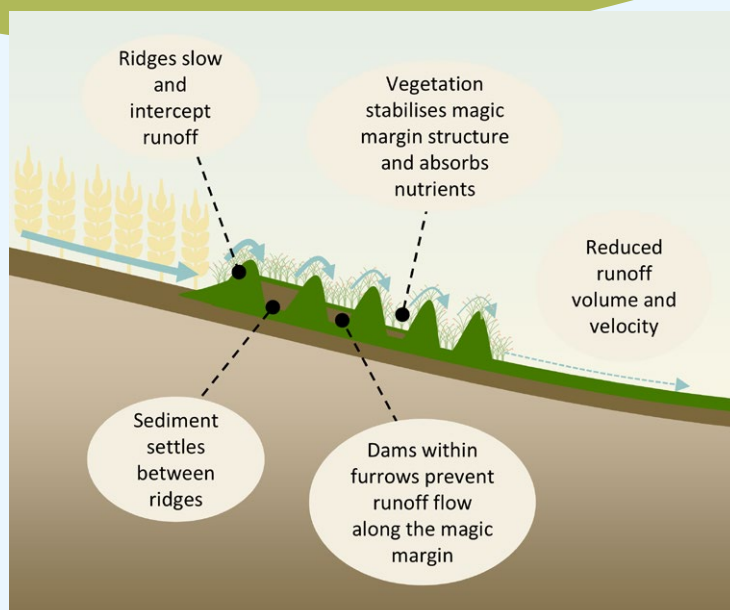


Figure 1: Magic margin schematic illustrating key design principles and associated hydrological processes.

www.protectingsharedwaters.com

Magic Margins (Micro-dams)



**PROTECTING
SHARED
WATERS**



PEACEPLUS
Northern Ireland - Ireland

Co-funded by the
European Union | UK Government
Republic of Ireland | Northern Ireland Executive

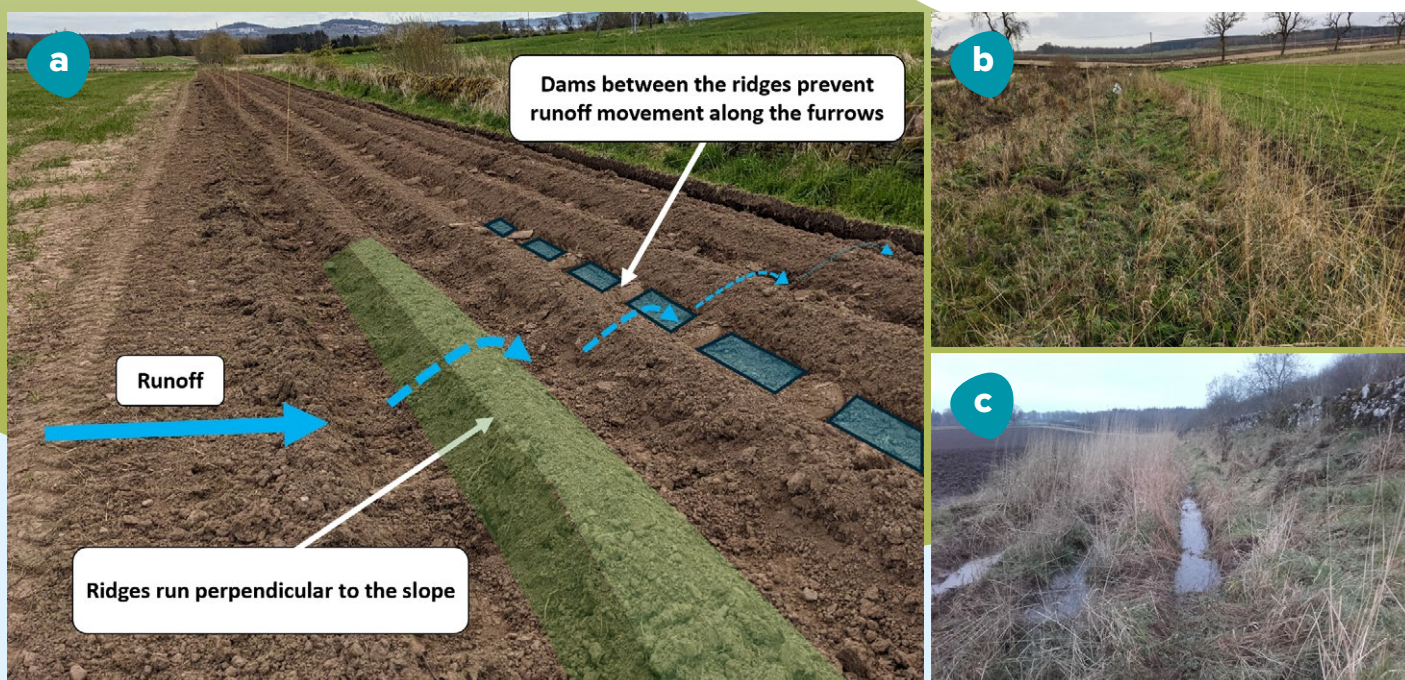


Figure 2: Examples of Magic Margins. (a) Ridges and dams created to slow runoff and trap sediment (photo: David Boldrin, JHI). (b) Newly established (1-year-old) with established vegetation (photo: David Boldrin, JHI). (c) Margin holding water following runoff event (Photo: Euan Caldwell, JHI).

Design and Maintenance

- > Ridges can be constructed with standard farm machinery (e.g. potato plough, tied ridger).
- > Incorporate small dams at intervals to prevent concentrated flow along furrows.
- > Sow with a mix of annual and perennial vegetation for stability and filtering capacity.
- > Monitor for sediment accumulation and structural integrity.
- > No fixed size – designs should be adapted to field slope and runoff risk.

NbS Measure Summary

Aspect	Notes
Set-up cost	Generally low, but construction requires a tied-ridger or similar tool to build micro-dams.
Maintenance effort	Low once established; margins need to be re-done when furrows eventually infill with sediment.
Lifespan	Can last several years (~10 years) before furrows significantly infill, depending on erosion rates. ¹
Flow attenuation	Margins can significantly reduce surface runoff by slowing flow and increasing storage. ³
Sediment retention	Highly effective at trapping sediment and reducing soil erosion from adjacent fields. ³
Phosphorous (P) removal	Effective at capturing sediment-bound phosphorous. ⁴
Nitrogen (N) removal	Some potential via enhanced infiltration and uptake by vegetation, but limited evidence.

Further Information

- ¹ Scotland's Farm Advisory Service (FAS) - Reducing Surface Runoff and Erosion with 'Magic Margins' (Web Link) (G)
- ² Roberts et al. (2023). Mitigating floods and attenuating surface runoff with temporary storage areas in headwaters. Wiley Interdisciplinary Reviews: Water, 10(3), e1634. (R)
- ³ Sittig & Sur (2023). Runoff mitigation on agricultural fields via micro-dams—Literature review and derivation of runoff curve number reductions. Environmental Research, 238, 117128. (R)
- ⁴ Keshavarz et al. (2022). Reduction of soil and phosphorus losses by using micro-dams in furrow irrigation. Water and Environment Journal, 36(4), 667-678.

G = Guidance, R = Research

MATCH FUNDERS



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreacht
Department of Housing,
Local Government and Heritage



www.protectingsharedwaters.com

The Protecting Shared Waters Project is supported by PEACEPLUS, a programme managed by the Special EU Programmes Body (SEUPB).