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CASE STUDY
09

In-field Sediment Trap

Excavated basin that slows runoff, captures sediment, and protects downstream water quality.

Overview

Sediment traps are shallow excavated basins placed in runoff pathways. They slow water, allowing sediment and attached nutrients to settle before controlled release. By intercepting polluted runoff, they reduce diffuse pollution and protect downstream watercourses and other nature-based solutions from siltation.

Primary Function

Capture and store sediment-rich runoff in a defined location where it can be periodically removed, maintaining channel capacity and reducing downstream pollution.

Location Considerations

- > Place at field margins or along flow pathways to intercept sediment-rich runoff.
- > Effective upslope of other measures (e.g. wetlands) to reduce pollution burden.
- > Larger surface area improves efficiency but requires more land.
- > Not suitable for dirty water (e.g. slurry, silage effluent) which must be treated elsewhere.
- > Must allow machinery access for sediment removal.

How They Work

1. Runoff Interception

Intercept surface runoff directing it into a small basin.

2. Temporary Storage

Water is held back, reducing flow velocity and providing time for sediment deposition.

3. Sediment and Pollutant Retention

Sediment and attached nutrients settle out within the trap, creating a point for removal.

4. Managed Water Release

Water is gradually released via an outlet or spillway.

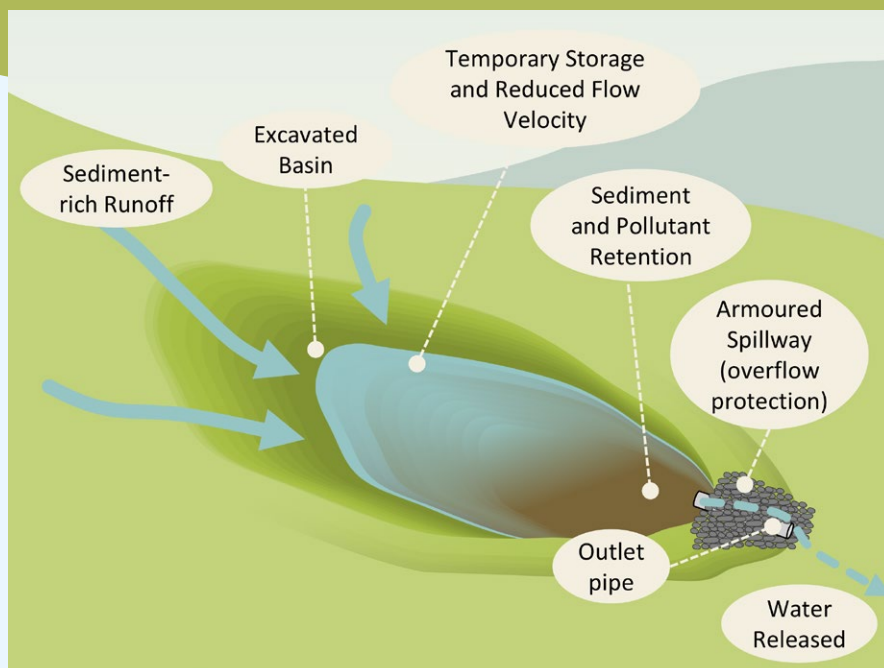


Figure 1: In-field sediment trap schematic illustrating the key hydrological processes that reduce sediment and nutrient losses from fields

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In-field Sediment Trap



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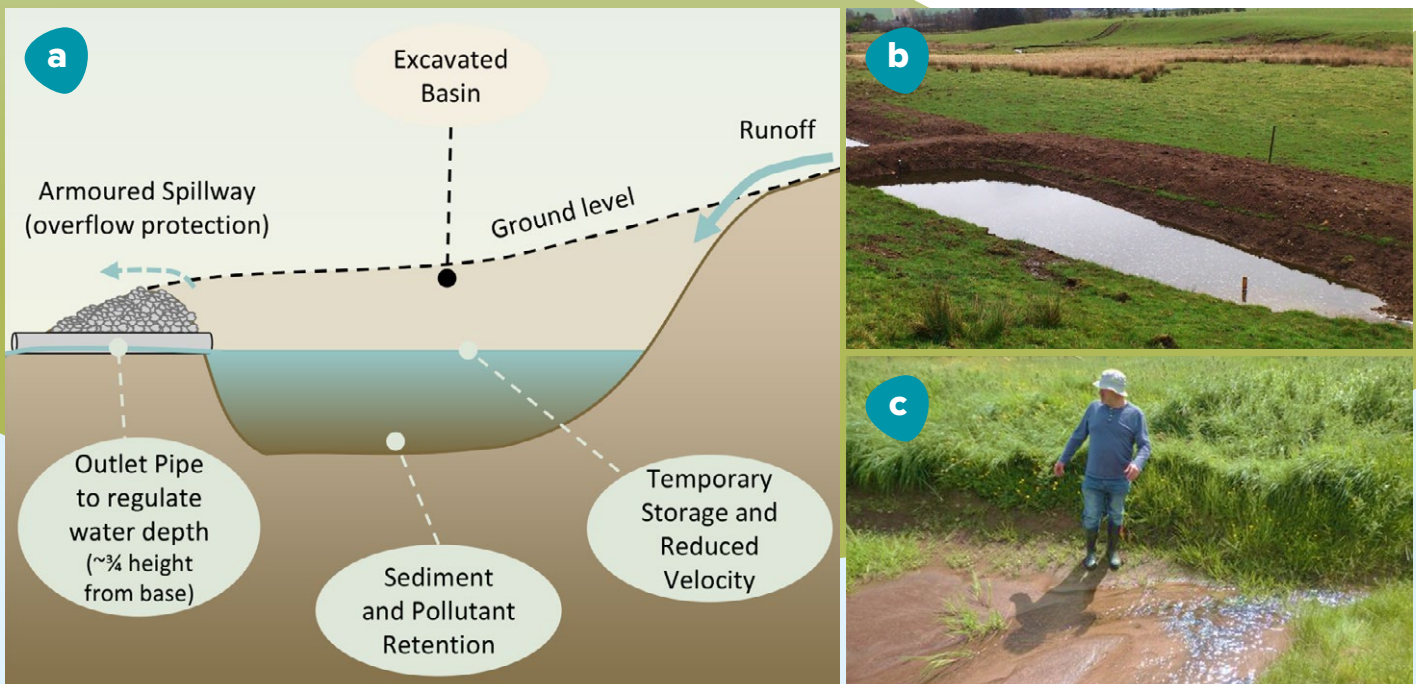


Figure 2: Sediment trap schematic. (a) Schematic cross-section of a sediment trap; (b) Field example of a sediment trap (Belford) (photo: Newcastle University); (c) Sediment accumulated within the trap shown in (b) (photo: Newcastle University).

Design and Maintenance

- > Excavate a shallow basin with gently sloping banks and a spillway sized to safely convey typical storm runoff.
- > Sediment retention capacity depends on runoff volume, mean water depth, and particle settling rate.¹
- > Fine sediment (e.g. clay) requires longer retention (≈ 6 days for 0.5 m depth).²
- > Inspect after major rainfall; remove accumulated sediment once it reaches about half the basin depth.³
- > Place excavated soil away from runoff pathways and include it in the farm nutrient budget.
- > Install in series where space allows to improve effectiveness.
- > Requires active management to remain effective.

NbS Measure Summary

Aspect	Notes
Set-up cost	Low, as they are typically simple excavated basins with a basic inlet and outlet.
Maintenance effort	Requires routine inspection after storm events and periodic removal of accumulated sediment.
Lifespan	Long lifespan but dependent on frequency of sediment removal.
Flow attenuation	Some attenuation through flow velocity reduction. ³
Sediment retention	Primary function: effective at settling suspended solids.
Phosphorous (P) removal	Particulate-P captured well within retained sediment.
Nitrogen (N) removal	Retention time assumed too short for N breakdown. ⁴

Further Information

- Wren et al. (2022). The natural flood management manual. C802, CIRIA, London, UK (ISBN: 978-0-86017-945-0). (G)
 - Murane et al. (2006). Control of water pollution from linear construction projects. C648, CIRIA, London (ISBN: 978-0-86017-648-0). (G)
 - Quinn et al. (2022). The role of runoff attenuation features (RAFTs) in natural flood management. Water, 14(23), 3807. (R)
 - Environment Agency (2012). Rural Sustainable Drainage Systems (RSuDS) (PDF Link). (G)
 - Smith & Muirhead (2024). A review of the effectiveness of sediment traps for New Zealand agriculture. New Zealand Journal of Agricultural Research, 67(5), 547-564. (R)
- G = Guidance, R = Research

MATCH FUNDERS



An Roinn Tithíochta,
Kialrais Áitiúil agus Oldhreachta
Department of Housing,
Local Government and Heritage



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