

The Ditch of The Future

or zero and first order channel management

80-90% of flow passes through this scale?

Paul Quinn
and many more

Catchment Systems Engineering

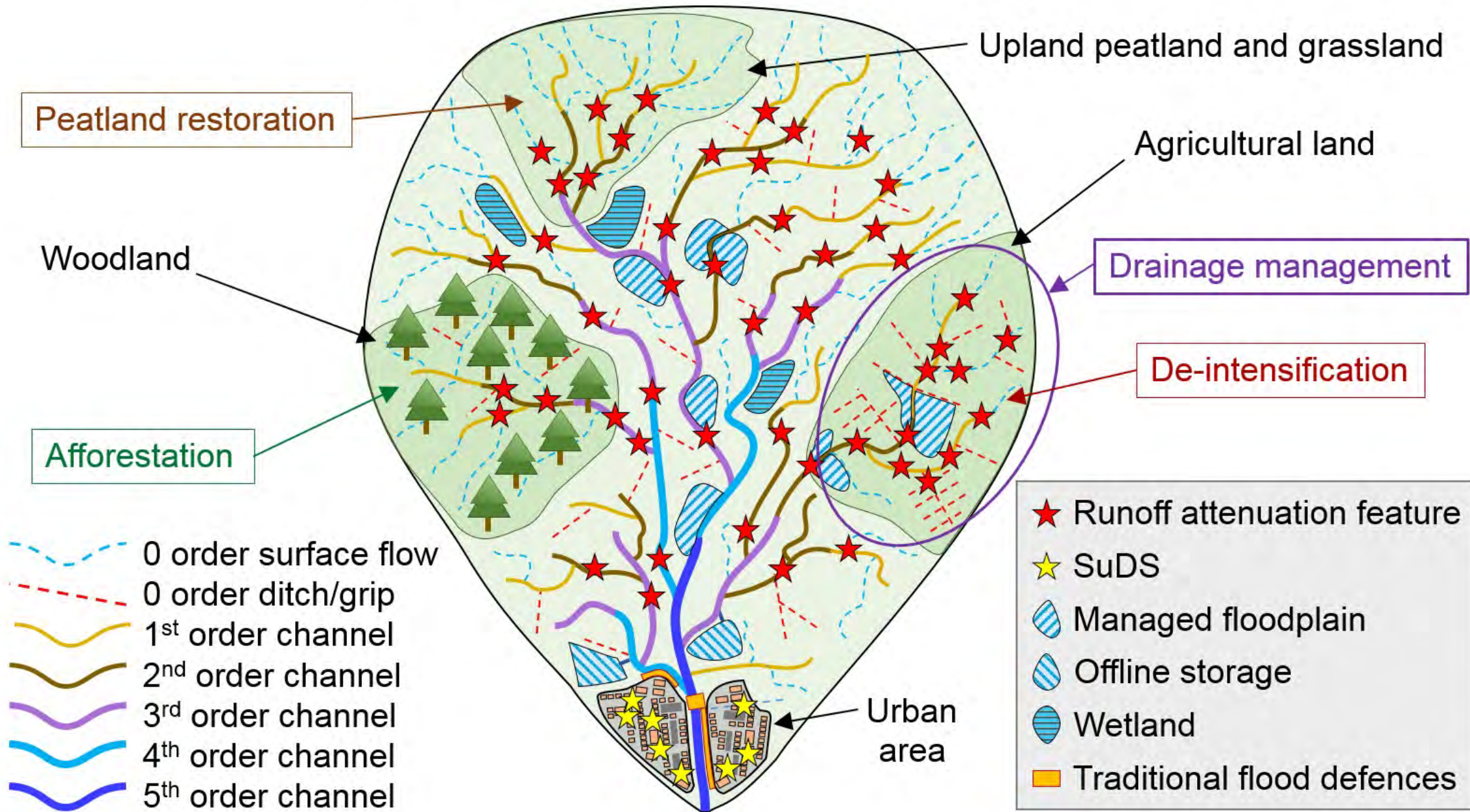
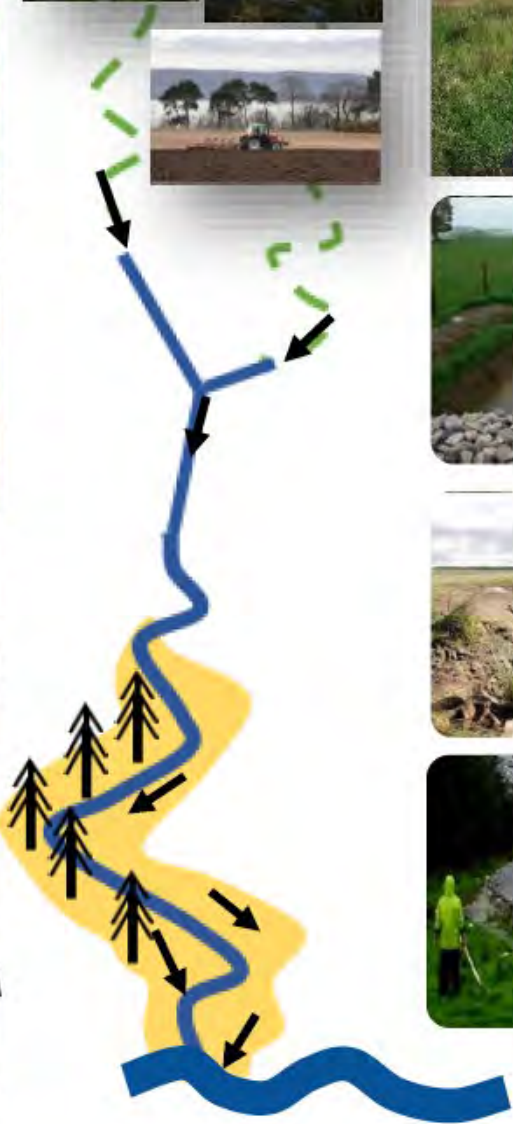
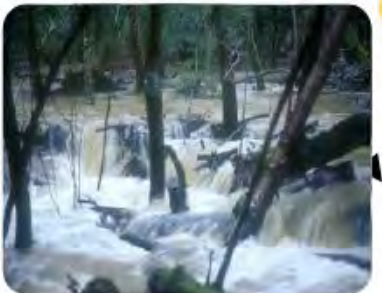


Figure 2 The 'treatment train' approach

Examples of holding water measures and their placement



Sustainable Drainage

Features: swales, bunds, ponds and grassy filters.

Buffer Strips: where designed to hold water.

The 'Ditch of the Future': the prime location for holding water and recovering lost top soil through erosion.

Small Headwater Floodplains: storing water, recreating wetlands, woodland, woody debris and new habitats.

The 5% Future
5% of land out
of production
And

5% of
floodplains for
temporary
flood storage

Nick Barber's PhD -- Netherton Flood scheme - Phase I mitigation

Three-tier RAF sediment trap

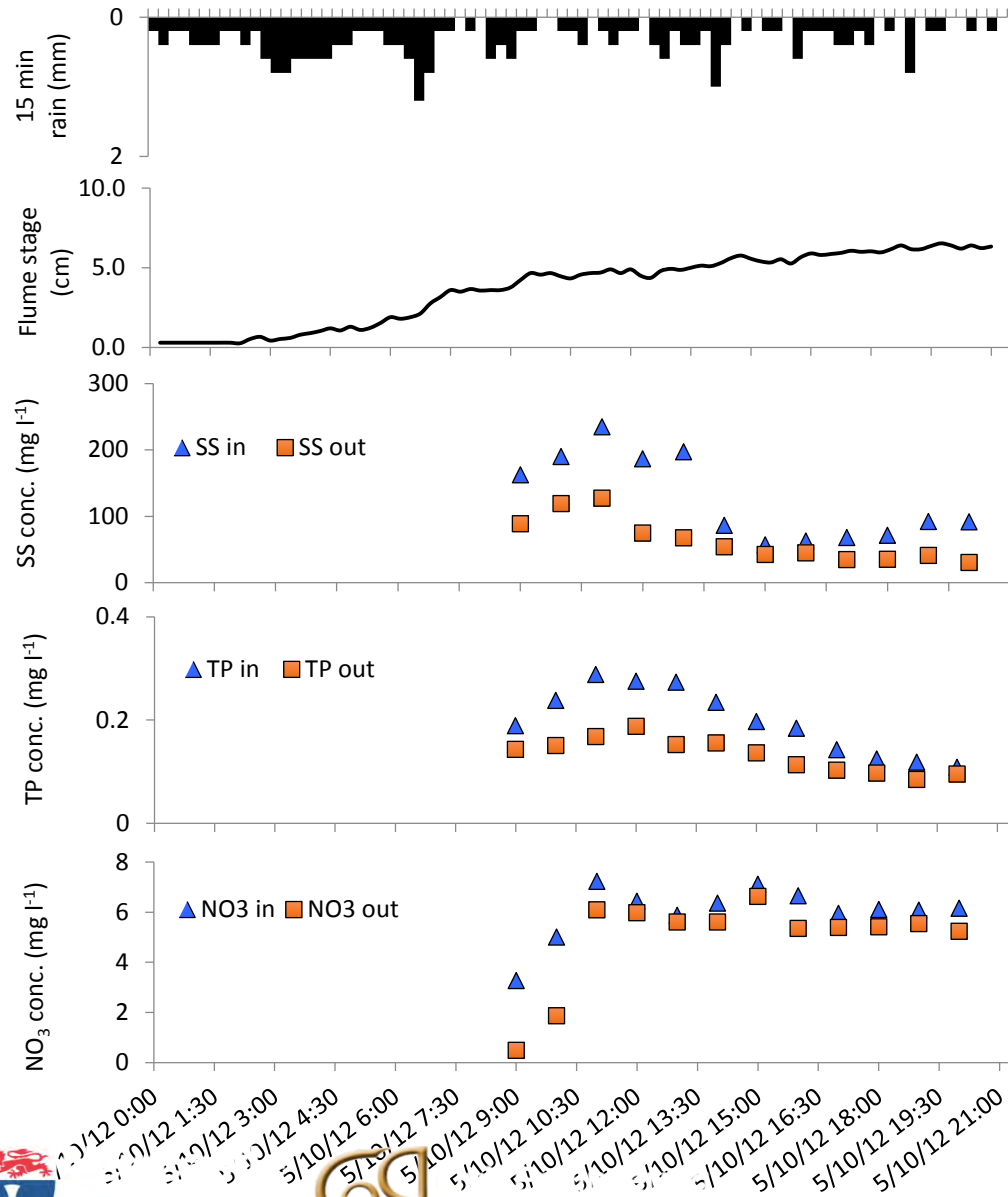
- Water storage capacity $\approx 280 \text{ m}^3$
- 70 ha contributing area



On-line Farm Pond -- at the request of the farmer!



RAF performance – Three-tier sediment trap



Retention (% concentration)

- SS: 25 – 67 (49% net retention)
- TP: 16 – 44 (33% net retention)
- NO₃: 5 – 85 (18% net retention)



Tracks acting as 0 order channels



Slowing flow in small ditches

Tracks acting as 0 order channels



New Ponding Zones



Improving farming conditions



Ditch Blocking on a floodplain, using a bund and a flow control structure



Bunds and Ponds on 1st order channel
Haltwhistle Burn



Ker-Plunk

Large sediment trap

Haltwhistle Burn



Large Woody Debris and Floodplains

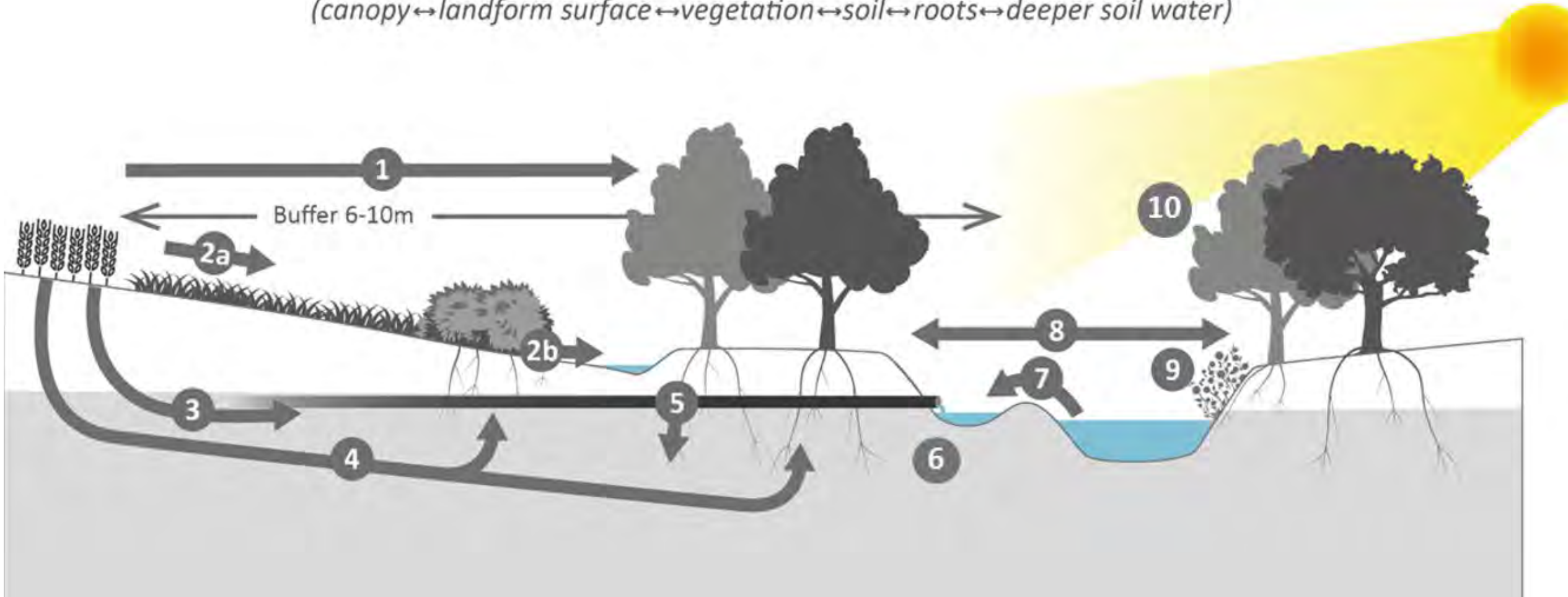


EA 3D Buffers Report

Best Use of Buffer zones

Buffer Strip 3D Structure

(canopy ↔ landform surface ↔ vegetation ↔ soil ↔ roots ↔ deeper soil water)



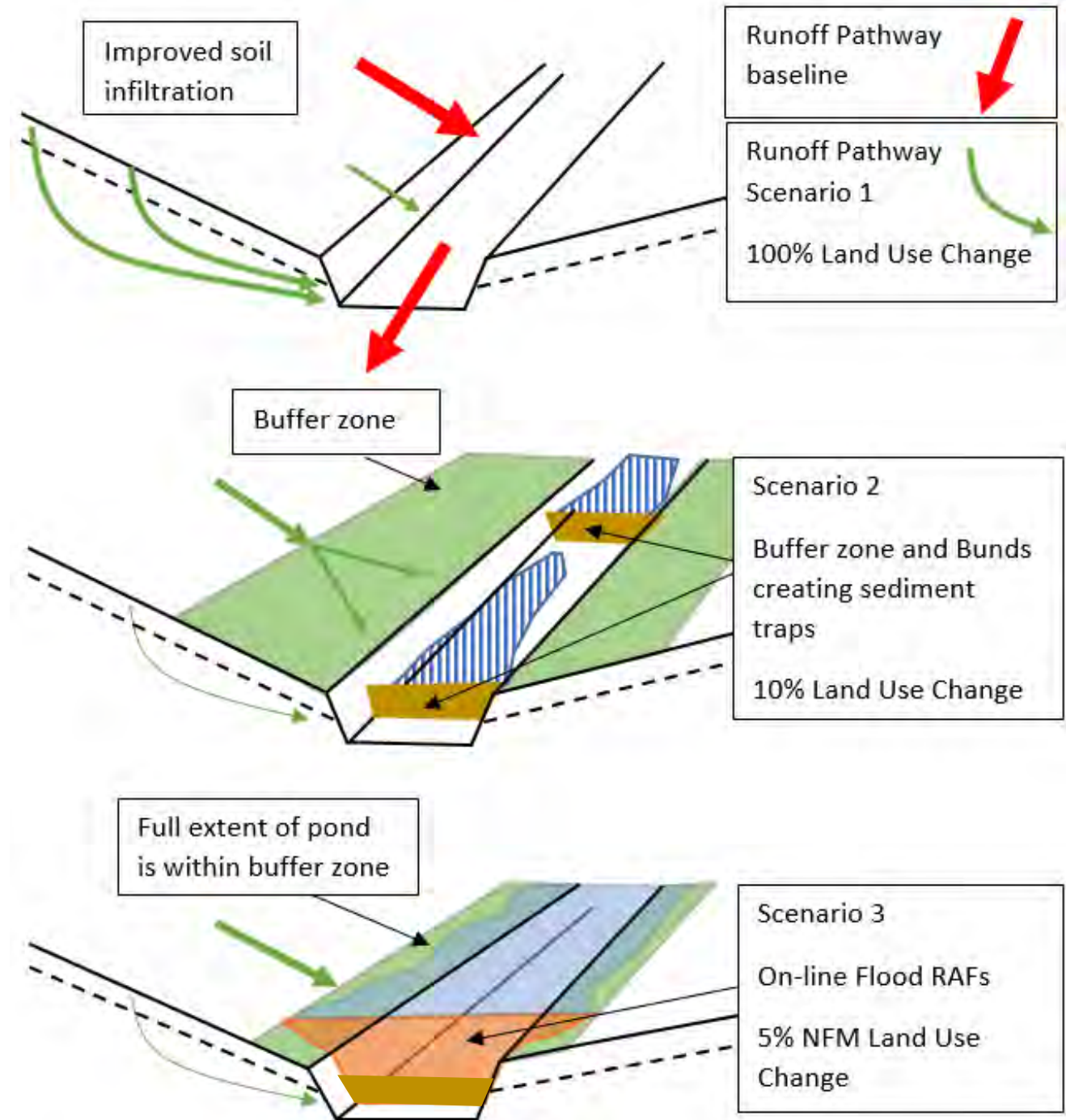
Opportunity

1. High flow
2. Green corridor with sediment traps

OR

The buffer/ditch of the future

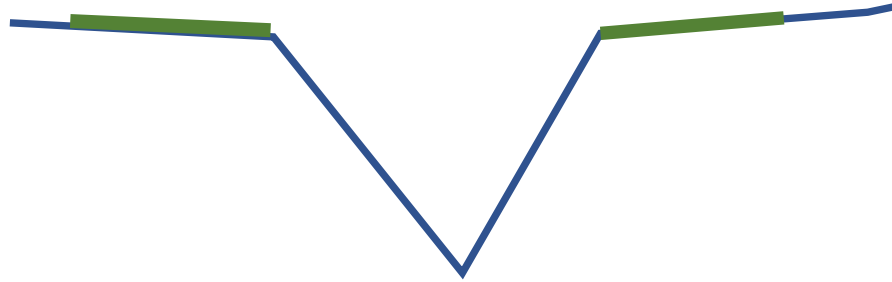
1. - Widened ditch
- High barriers in the ditch
- Saturation of buffer zones
- Temporary raising of water table
- Increase buffering time



Before

and

After

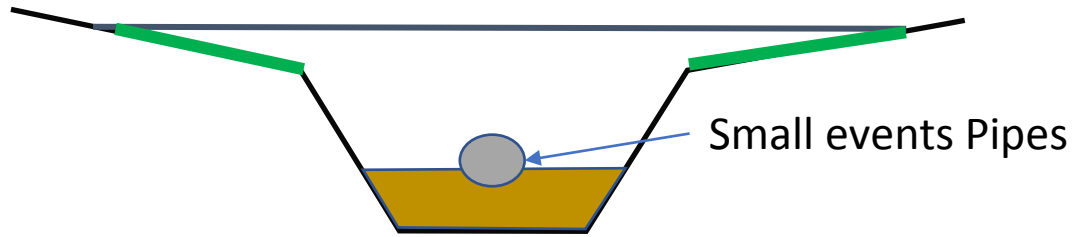


Traditional ditch shape
with a small buffer zone

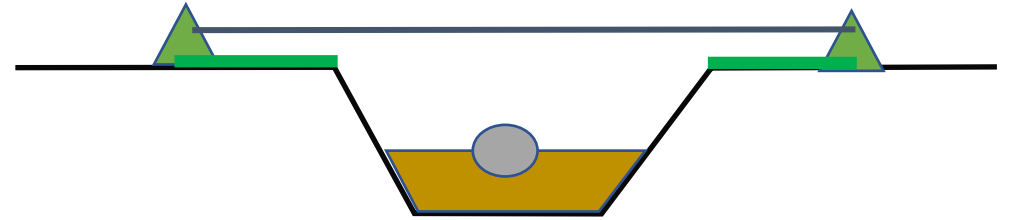


Future ditch, where the buffer
zone is exploited to change the
shape and hydraulic function
of the ditch

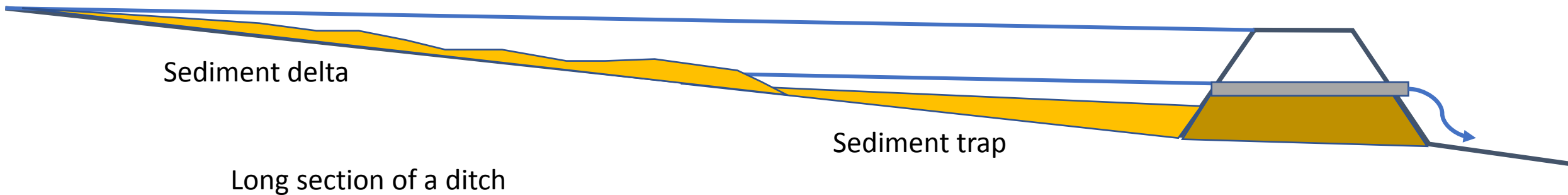
Operation of ponded buffer zones



X-section 1 with gradient on hillslope

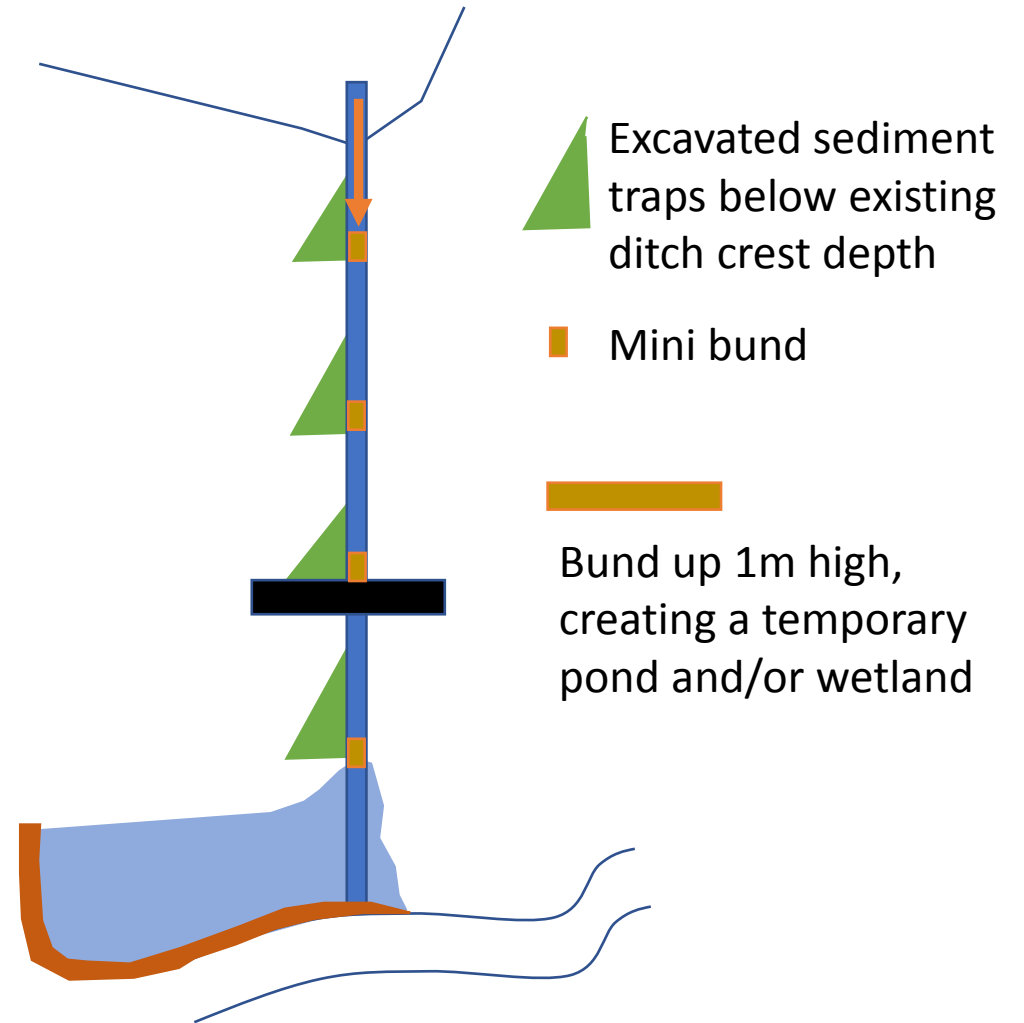
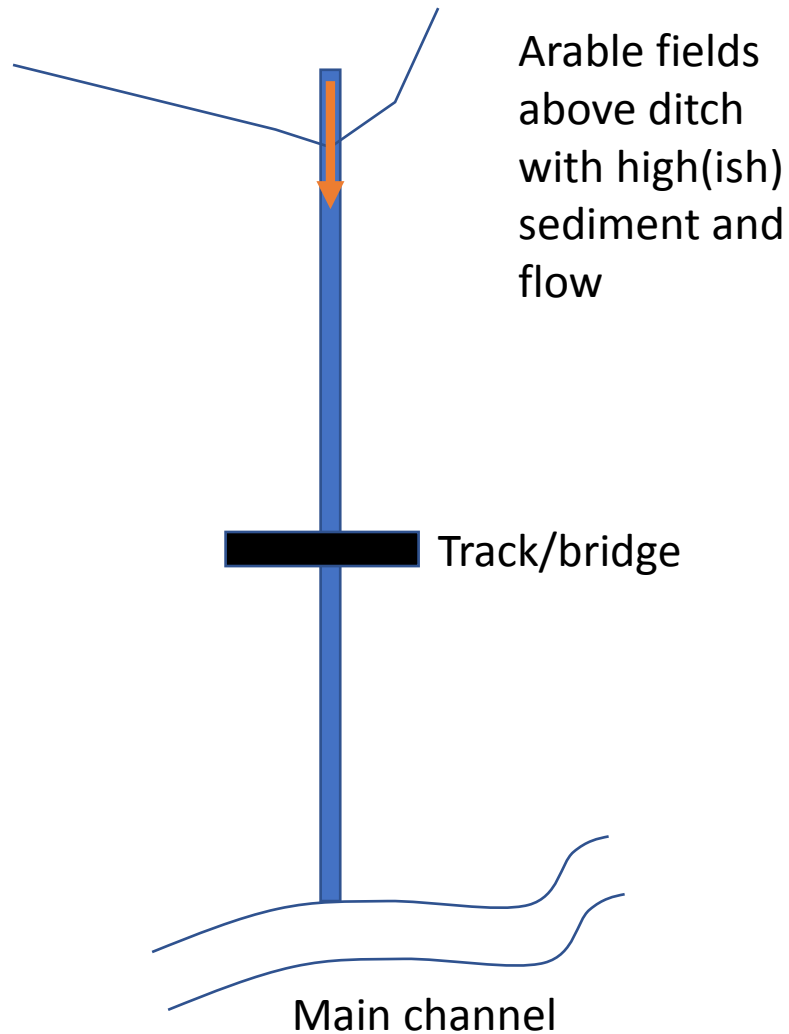


X-section 2 no gradient on flat ground



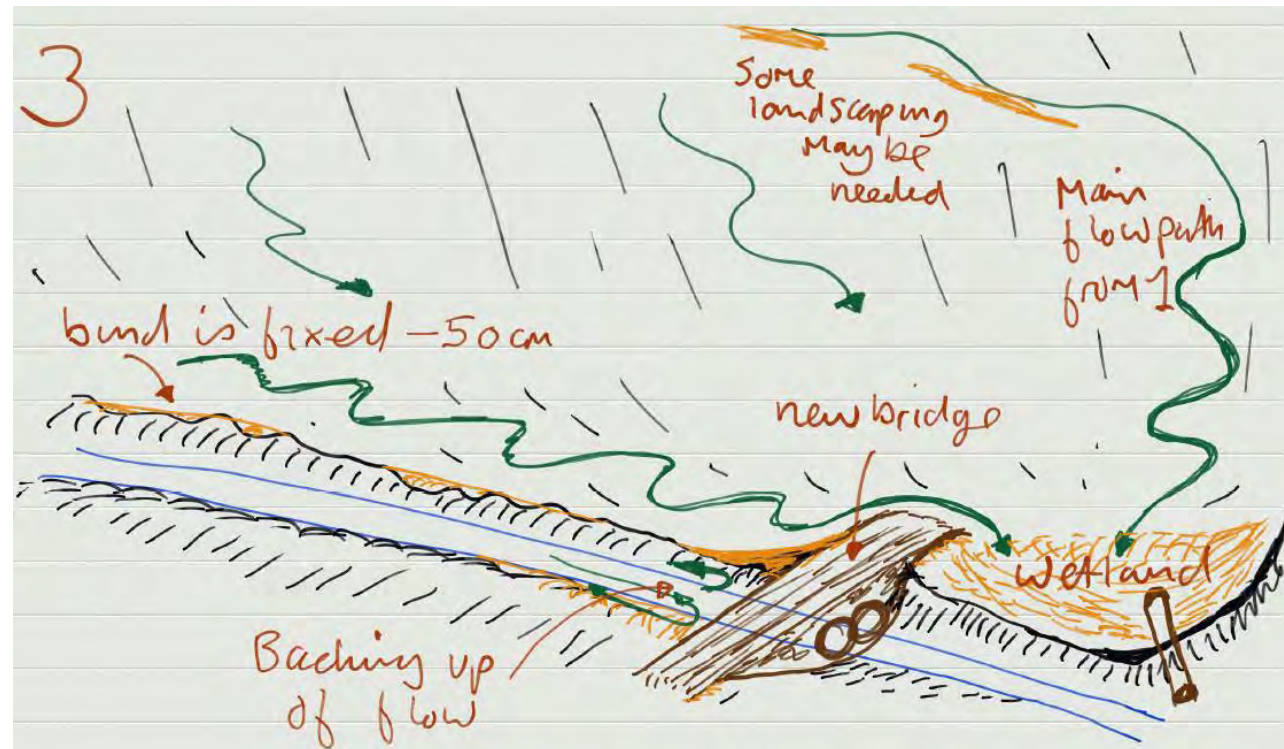
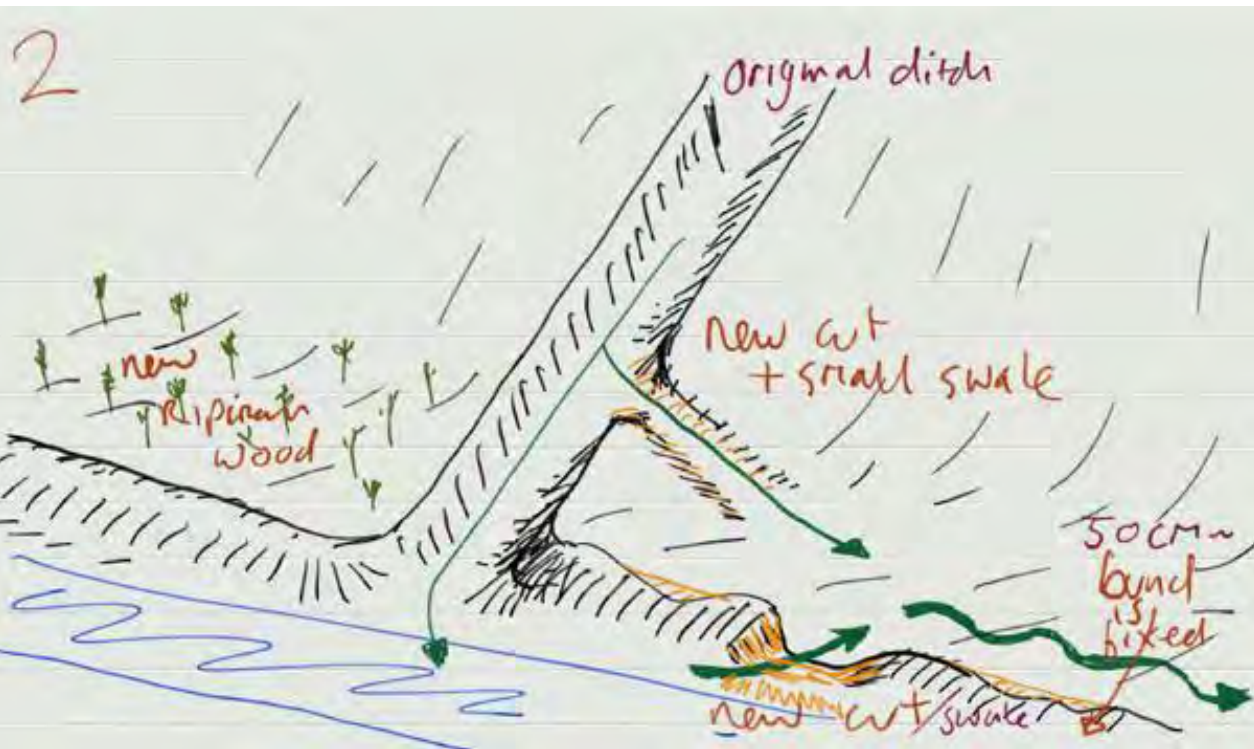
Long section of a ditch

E.g. Ballycannew Site Proposal



EPA Slowwaters Project Ballygow Proposal

Slowwaters



Rusheen Co. Cork

