

Water Management on Your Farm: Slowing the Flow



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As climate conditions continue to change the sustainable management of water on farm is of great concern for many land managers around Scotland. From unprecedented wet weather to drought conditions, farms need to become resilient to ensure that they can try to minimise the impact of these changing weather patterns on land.

Changing climate and its impact on farming

As climate patterns continue to change in Scotland, land managers need to prepare for new weather patterns. Moving forward it is expected that **summers are more likely to become drier, while winters are wetter**. Retaining water on your land during wetter seasons can significantly increase soil moisture and can lessen the impact of dry periods. Working with the river/floodwater to utilise the water available can help your farm and support the ecosystem services within the area. This guide looks at different concepts, which can be implemented to encourage water retention. In addition, the schemes offer multiple benefits to land while retaining water on your land.

Concepts to retain water at source

Offline storage

Offline storage are areas alongside watercourses, or areas which run adjacent to runoff pathways, designed to temporarily store water during times of peak rainfall. The systems are designed with an inlet, to allow water to enter the storage area during peak flow, and an outlet to release the water slowly back to the local environment once flows have decreased. This reduces the impact of flooding on the immediate area, and further down the catchment. The water is then stored at site, allowing the immediate environment to retain and utilise the water resource. Storing the water allows for longer retention time, as the soil and vegetation are given time to utilise the water resource. In addition, the system allows for sediment settlement, which reduces soil run off into waterbodies and retains this on farm. This in turn facilitates in reducing diffuse pollution and improve the local water quality.

Offline storage areas need:

To be appropriately designed and planned by specialists to ensure that they comply with regulations.

Work with the land and not cause detrimental impact to the catchment area.

Suited to areas that are commonly prone to wetness and can be allowed to flood when required.

Avoid steep slopes to ensure retention and storage capacity.

Ensure that public pathways or significant areas, such as SSSI, SAMs etc. are avoided.

Storage Pond

Storage ponds are areas of permanent water, with capacity for additional storage as and when required. Storage ponds should be designed to permanently store water but have the ability to store and slowly release additional water during peak flows. Sizing the pond should be based on annual rainfall, ensuring that capacity is calculated to incorporate high flow periods. The ponds should be located at low end of fields, incorporating the natural runoff pathway to catch water and utilise on site. Once stored the water can be store until the surrounding area can utilise the additional water available. These ponds offer great storage capacity, however, additionally they can also offer great wildlife havens to your farm.

Scrape

Scrapes are an excavated depression designed to store water overwinter and gradually dry out over spring/summer. Scrapes can be small or large and a good low budget option for farmers who are looking at storing water on their farm/trying to reduce the impact of extreme weather. They are not designed to hold water year-round and are much shallower than pond areas. The scrape can be designed to suit your farm. One large scrape, appropriately located, can offer multiple benefits or you can introduce multiple smaller scrapes along the runoff pathway to retain water in peak flows and offer resistance to water erosion on your farm. Ideally located on runoff pathways, at low point of field, slightly higher than floodplain. Avoid steep, unstable slopes where erosion would occur.



Swale

A Swale is a vegetated channel, which can store and convey water. Swales fall into two categories, conveyance and storage. Conveyance swales primarily are installed to help move water to a storage feature, e.g. a pond or wetland. The swale diverts water from runoff pathways and directs the water to a place where it can be utilised and stored, slowing the flow and reducing the amount of water quickly entering the water course. Storage swales are designed to hold and receive runoff, utilising vegetation and low gradients to slow the flow. Swales can additionally be used to treat and reduce runoff water from your farm, which increases infiltration and water quality in the catchment. Ideally suited on gradual gradients, but if designed carefully can be incorporated into a landscape.

Bund

Bunds are a bank of material, which can be used to store, divert, hold water. These features are designed site specifically, tailored to the needs of the farm and the water pathways through farm. Ideally suited where runoff can be intercepted, diverting water from paths, and reducing soil and water runoff from the farm. The water is retained within the bund until the water can naturally dissipate and be utilised by the surrounding area.

Wetland

Introducing wetland areas to your farm may be of great benefit if you regularly experience recurring flooding in the same location of your land. Many areas have historically been drained for agriculture, however, setting aside areas to be wet annually can help divert flooding issues around your farm. Wetlands can help mitigate the impact of increased rainfall and retain water on your land for longer periods, increase groundwater recharge and water retention, therefore, reducing the impact of water scarcity in drier months.



Wetlands additionally provide a haven for wildlife and can provide key wildlife corridors between your farm and the water environment.

Leaky dams/barriers

Leaky dams are designed to replicate naturally occurring vegetation deposits into water bodies, such as branches and trees falling into waterbodies. This natural process increases channel roughness, provides crucial habitats and shelter, and helps to slow the flow. However, previously this vegetation in the water system has been deemed as something which inhibits the river flow and needed to be removed. Installing 'leaky dams' in appropriate locations helps support the natural ecosystem of rivers and burns. These features can be installed in a series along a burn/river (depending on width) and can help slow water flow, help retain water within the land and be utilised by the surrounding land when required. The dams additionally allow for soil infiltration, root uptake and reduce flooding down catchment, habitat creation, improve water quality, stabilise riverbank and increase soil moisture – providing drought resilience. The water is released at a slower rate from the area, reducing peak flows.

Leaky dams need to be appropriately located and designed. Ensuring that locally sourced material is used helps features and enhance aesthetics and sustainability. They are suited to rivers/burns not that wide or steep, situated away from infrastructure, where damage could result from the feature dislodging and the material travelling downstream. The dams need to be located in areas where water can gather, without eroding and being detrimental to the surrounding use of land.

The dams can additionally support wildlife in the area by providing habitat, which offers shelter and shade from increasing water temperatures and offers a retreat from potential predation. The location and design of the dam needs to incorporate the needs of the species who use the waterbody. Fish migration should not be hindered by the design and this needs to be incorporated within the plans.



Projects around Scotland

Upper Nith River
Restoration Project



Allt Lorgy, River
Dulnain



Allan Water
Improvement
Project



Dee Catchment
Partnership



Further Information

SEPA (2015) Natural Flood Management Handbook

Farming and Water Scotland (2016) Natural Flood Management: A Farmer's Guide

NFM Network Scotland

CIRIA (2022) The Natural flood management manual (C802F)

McLean, L. et al (2015) Learning from community led flood risk management CREW report