

## Drainage ditches – slowing the flow to reduce the potential for erosion

Water flow in storms is directed towards drainage ditches. In flood conditions of over 50mm rainfall in 24 hours there is likely to be some erosion of soft bottom ditches. In extreme floods such as Wray Flood in 1967 there was around 120mm of rain in 90 minutes. This caused extensive erosion and washed out ditches and small gills and in some places deep gullies were formed. More than 1000 trees were washed down the Roeburn. Some of these gullies are still eroding over 50 years later.

These fast flowing ditches take water down the river very rapidly causing flash flooding downstream. In summer storms, when the ground is warm and dry, water is repelled by the land. The erosion is likely to be more severe, as the water flow tends to have horizontal vortices that dig into the banks.

These flood and erosion events take valuable soil away from the farmland and suck nutrients out of the land. The erosion from peaty soils reduces the river pH. There have been very acid pHs measured in the River Roeburn – around pH 3.5. Acidic enough to kill most of the insect larvae in the river.

Drainage can be designed so that it remains effective in removing excess water, but does not cause erosion.

Single log check dam



Single log check dam with sphagnum growth after 4 years



Small stone check dam



A series of small stone check dams



Turf check dam with rushes – only suitable for shallow slopes.



A series of single log check dams in drainage ditch



Turf check dam with rushes after 8 years

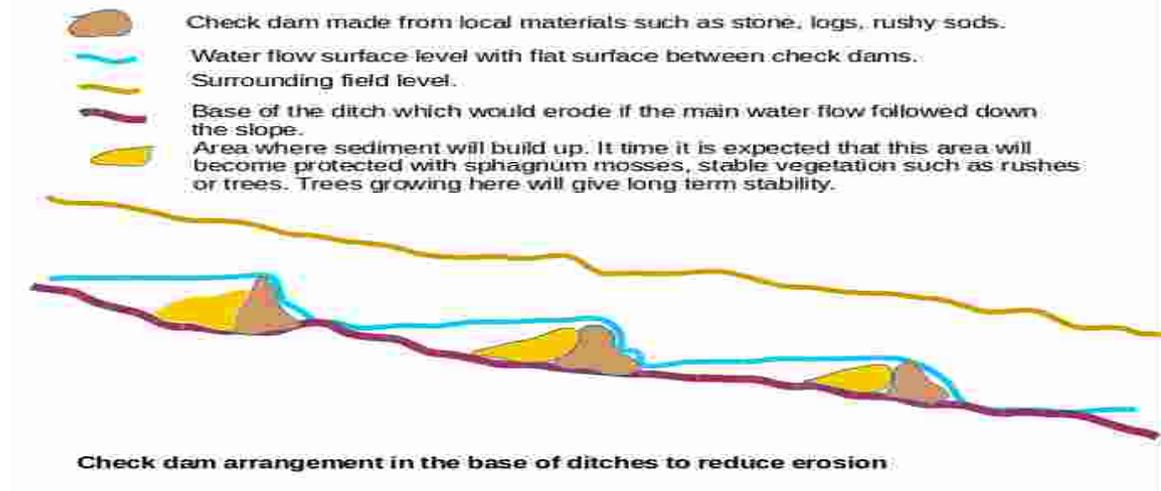


The design of the check dams in drainage ditches aims to have the base of a higher check dam at the same level as the top of the lower check dam. This keeps the surface of the water level with a slow flow and minimum erosion. On steep slopes there will be many more check dams compared to shallow slope.



Soil loss from eroding gully off Whitmoor with a rainfall around 50mm in 24 hours. What would this look like with 120mm in 90 minutes (Wray Flood)?

It moved the whole stream bed to the middle of a hay meadow and covered the land with boulders. It destroyed an important spawning area for trout(1967).



Where possible the centre of the check dam is slightly lower than at the ditch sides. This concentrates the faster flow down the middle of the ditch. The down side slope of the check dam needs to be stable enough so that it doesn't erode when storm water flows over it. Make sure that where the check dam meets the ditch bank there are no areas where the water can escape and cause erosion.

The build up of sphagnum mosses in the ditch base keeps the water cooler and enables some to infiltrate into the lower ground water. They additionally provide a good habitat for frogs and newts.

Over time the above the check dams may fill with sediment which is prevented from being lost down stream. Vegetation such as rushes will stabilise this and further slow the water flow. In the long term trees such as alder or willow might grow on this sediment and provide long term stability of the ditch base.



Stone check dam and alder trees slowing the flow.

All these actions of ditch check dams take place in the ditch while it still removes water from the surrounding land.

Generally locally available material is used for making check dams.  
Examples might include piles of stone, rushy turfs, logs, heather bales, christmas trees and bundles of brushwood. There will be other materials that will work well, don't be afraid to experiment.

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