

Peatland Action Guidance for land managers

Installing peat dams



Peatland ACTION

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Peat dams should be considered the default technique to block ditches or moor grips. Blocking erosion gullies may also benefit the peatland, but this usually requires other techniques to be used. They are much cheaper to install than dams made of other materials, especially where a large number of dams are required. Peat dams can be used on deep peat or shallow peat, where plastic dams cannot form a watertight seal. The results blend in with the landscape and the excavator can be used to profile dams and ditches to prevent deep, steep-sided pools being left behind after ditch blocking that might be a hazard to stock. The aim of the dams is not only to hold back water in the ditches, but also to direct water away from the ditch line and back onto the bog.



A good site for peat dams

Circumstances where peat dams do not work

1. Sloping ditches or grips

Peat dams are usually only successfully on a shallow slope, although the method can be adapted to steeper slopes (see alternative method below). If the gradient is too steep, the water flow can cause erosion over the top or round the sides of dams of the dam, resulting in failure. Where dams need to be installed on the sloping edges of lowland bogs, we advise that plastic piling is used.

2. On wide drains/ditches

Hand built peat dams can only be made in ditches no larger than 70cm wide and 60cm deep. Machine built dams can be in ditches no larger than 150cm wide and 120cm deep, depending on the peat composition. Above these dimensions, the peat dam structure can become unstable particularly if flow rates are high.

3. On drains/ditches on slopes

In high flow ditches on slopes, turves should be placed on top of dams at a 45° angle to the flow of water to help prevent erosion.

Legislative Requirements

CAR licensing

The potential requirement for a CAR (controlled activities regulations) license must be considered when planning any ditch-blocking work. SEPA will not normally require authorisation for the creation of an impoundment designed to raise the water levels to restore a degraded wetland or peatland where:

- a) The activity is carried out in artificial drainage channels or eroded channels.
- b) The activity is not associated with an abstraction.
- c) The impoundment is created in a watercourse less than or equal 1m wide at its widest point.

In any other case a CAR licence is required. Further information on the licensing process can be found at: https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf

Peat condition

The peat used for damming must be saturated, but not sloppy. Peat that has been dried and exposed to air will not form a watertight dam. Only peat taken from the bottom and wet sides of the ditch should be used. The original ditch spoil is not suitable; as with other dried peat, its structure and water holding properties will have been damaged by exposure to air and weathering.

Availability of suitable machinery

Smaller low ground pressure excavators are capable of constructing peat dams on drier firmer peats, but wetter peats will require wider tracks. Low ground pressure excavators used to be hard to obtain away from peat extraction sites (mostly in the Central Belt and Aberdeenshire). Many more contractors now have wide tracked excavators as part of their fleet, due to their use in wind farm construction.



Selecting locations of dams

- It is advisable to check aerial photographs for linear changes in vegetation that may indicate hidden ditches before going on site. Ditches are not always apparent on the ground. Vegetation may grow across the top of a narrow ditch, whilst water actively flows underneath.
- The intensity of damming required depends on the flow of water in the ditch, and the amount of water held back by individual dams.
- Generally dams are placed at no more than 10 and 20 metre intervals on flat ground, but will need to be much closer on sloping ground. It is expected that the final water level from the lower dam will rise half way up the upstream dam. The final water level should be at the peat surface or no more than 20cm below the surface.
- Select a location where the ditch narrows to form a pinch point. This provides a firmer footing for the dam and uses less material.
- Check for small depressions and channels at the edges of the ditch that could effectively divert or restrict the amount of water contained by the dam.
- Cracks running parallel to the ditch may need blocking as well.
- Where ditches are running parallel, stagger the dam positions, to increase the wetting effect on the surrounding peat. The wetting influence of each dam will extend sideways into the peat for up to 10 metres.

Where not to site dams

Further guidance is available on our website: www.nature.scot/peatlandaction

- Avoid undercut banks, tree roots and thick grass tussocks. If unavoidable, tree roots and grass tussocks can be cut with a chainsaw.
- Avoid dry peat banks that will slump when wetted up.
- Avoid peat pipes, cracks and fissures where water may suddenly disappear
- Avoid dams in the dry edge of the moss as these will inevitably leak due to cracks in the peat. Trench bunding may work better in these places.
- Ensure that the dam location is not too close to the junctions with tributary drains, as these points have unstable peat. Two to three metres downstream of these junctions is ideal, as the peat is firm, but there is the added benefit that two ditches are blocked by one dam.
- Ensure dams are clear of timber/brush previously placed in the ditch. Even small amounts of timber/brush can make it difficult to install the dam properly.

Method

Installing peat dams using an excavator

Careful planning is important for a machine operation, including planning locations for delivery, access and re-fuelling of machines. Machines that work on bogs need to be low ground pressure and excavators will require a moderate bucket reach to reduce movements. It is important that operators are experienced at working on deep peat and are made aware of the specific risks you may have on your site. It is a good idea for the operator to walk the site before bringing the machine on. On wet parts of the bog, the excavator may need to travel on bog mats.

Method (also see diagrams for hand-built dams below)

1. Remove the turfs from the surface of the in-ditch borrow pit and the dam location, and place to the side.
2. Clean out/push away from dam location the unconsolidated peat and debris.
3. Key the dam into the sides of the ditch, with a 0.5 to 1 metre indent on both sides.
4. Use consolidated peat from an in-ditch borrow pit upstream to create the dam. Avoid leaving steep sided or deep holes behind the dam, as these can be dangerous to stock.
5. On a sloping site, shallow swales that extend out (or on one side) from behind the dam can be added to re-direct water from the ditch line.
6. Regularly compact the peat in the dam with the back of the excavator bucket to ensure an effective seal.
7. When the dam is 50cm above the surface place the vegetation turfs across the top of the dam (and in swale if present) and press with the bucket to ensure good contact between the turf and the peat.

For further guidance also see [the SNH ditch-blocking demonstration video](#) and

Creating successful peat dams

- Creating good peat dams requires a skilled machine operator who understands what result is required. If possible, get supervision for the creation of the first few dams by someone who has seen them made before.
- Dam thickness will depend on the ditch width and will increase as the ditch widens to counter the increased water pressure.
- Make sure that access can be gained whilst maintaining stock proof fences and any public access points.
- Care should be taken to avoid areas of deep open water where stock might drown. The sides of the borrow pit should be sloped to allow animals to climb out.
- The excavated material should be flattened down to almost level with the overall bog surface (allowing for the peat to slump/settle slightly). Large hummocks of spoil should not be left, as they are a prime location for invasive scrub to germinate, particularly on lowland bogs.
- Get the contractor to distinguish between time spent on site and time spent transporting machinery when quoting.
- It can be difficult for machine operators to get their bearings and interpret maps on unfamiliar open ground.
- Double-bunded cells should be used for storing fuel. Refuelling points should be located off the wetland site and at least 50m from any watercourse.
- Sharp or stationary turns should be avoided as they churn up the peat and dislodge surface vegetation. If this occurs, replace the turves in their original position.



If dislodged by turning, replace turves in original position

An alternative method for slopes and wider ditches: re-profiling ditches

On sloping sites or where ditches are wider, better results may be obtained by damming and re-profiling the ditch. This is done by installing peat dams close together, e.g. every 5-10 metres, then using the machine bucket to roll back vegetated turves on either side of the drain in consecutive strips. The sides of the ditch are then re-profiled to a shallower gradient by pulling down peat from the banks and compacting. Water can be directed away from the ditch line using swales behind each dam. The turves are then rolled back over the reprofiled sides and compacted using the bucket. The swales and any remaining areas of bare peat need to be carefully patched with turves, so that the vegetation recovers and peat is protected from erosion. Re-profiling requires training and/or experienced supervision to achieve a good result.

Questions that you should ask potential contractors are:

Where will the excavator be delivered and unloaded?

Excavators are transported on large low loader lorries that will require good roads on which to drive and turn.

Where will the re-fueling point be?

This should usually be off the peatland and the contractor should be prepared with a spill kit, should a spillage occur.

Will the excavator fit through our existing gates?

Often bog excavators have extra wide tracks that mean they will not always fit through standard gates.

What route will the excavator take onto across and off the site?

Work should start at the furthest point and work back to the exit. If this is not done the excavator could become trapped by the rising water levels it is creating by damming. The route should minimise ditch crossing points and very wet areas.

How will machines access the site if further work or maintenance of dams is necessary?

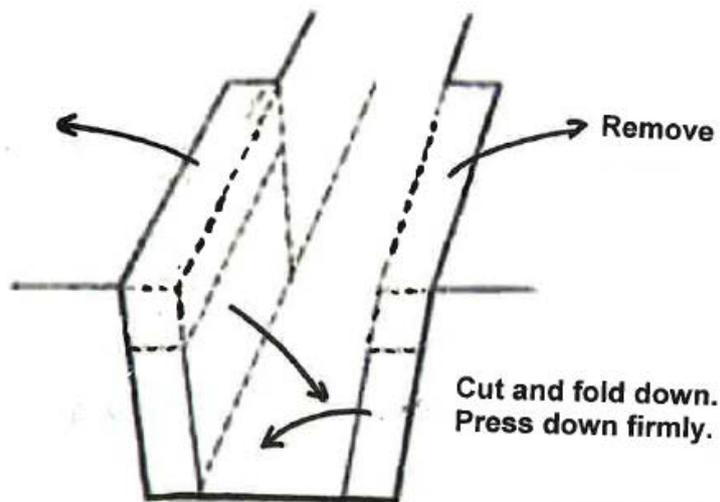
Hand digging

Generally we do not recommend building peat dams by hand, although they can be worthwhile where machine access is not possible. Building dams by hand is exhausting and it is difficult to achieve a good, long lasting result. Modern low-ground pressure machines can be taken onto most sites without causing any long-term harm.

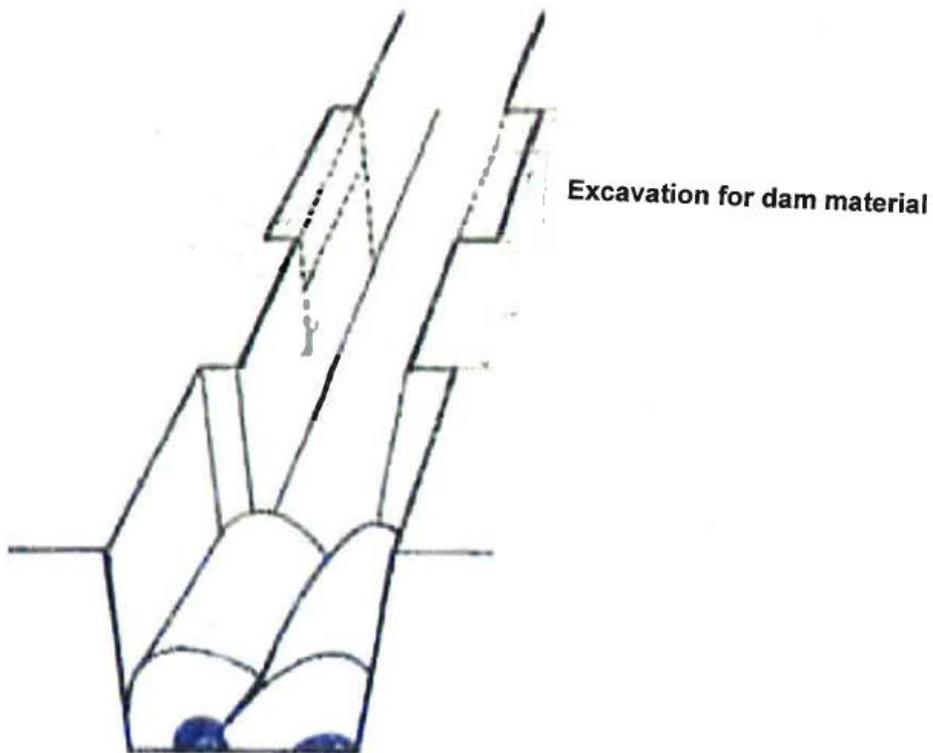
A two person team with two spades or a rutter and a spade can successfully make small dams. Each dam will take two people around 30 minutes including walking time. In addition, two grabs, that are basically four-pronged forks with the tines bent at right angles, are required to move the cut block of peat. Blocks of wet peat are cut to an approximate size of 20cm x 30cm x 20cm.

The principle of the exercise is to create a notch to ensure the dam is keyed into the surrounding vegetation. Then to create the dam using peat from a borrow pit located in the ditch upstream of the dam.

1. Remove all unconsolidated peat and debris from where the dam is to be constructed
2. Place any turfs to one side for later use.
3. Cut a notch on both sides of the ditch 1 metre wide, 20cm thick and 20cm deep. Remove the sod.
4. Continue cutting down the back of the sod, and fold into the ditch leaving a hinge at the bottom of the sod. Press and compact each sod with your feet.



5. Move upstream, leaving a gap of 1 metre between the dam notch. Remove the surface vegetation at this point. Cut further sods from the wet peat from the sides and base of the ditch. Avoid leaving steep sided or deep holes behind the dam, as these can be dangerous to stock.



6. Place these sods on top of the folded sods and compact. Continue this process until the peat is just above the top of the ditch; this allows for further settlement and shrinkage.
7. Place growing vegetation/turfs on the top of the dam to assist rapid regrowth and dam stability.

