Plastic Piling - Method of Installation
Restoration Technique 2

(This method of installation should be read in conjunction with Peatland Re-wetting Design & Specification Sheet – 02 – Plastic Piling)

Plastic piling dams are a re-wetting technique installed in place of peat plugs where the ditch is large or where water flows are high or on steeper gradients. Often they are installed at the end of a ditch before it discharges in to a boundary ditch. Plastic piling provides additional structural strength to the dam and this allows deeper water with higher water pressure to be retained. It ensures the dam does not fail or erode due to water movement. It can also be used as a sluice dam where water is controlled before discharging off site and in to the boundary ditch.

The plastic piles interlock and act as an impervious barrier to water flow and this raises water within the ditch. Since the piling dam is impervious it is important that the plastic piling is installed correctly to create a structurally strong structure. To ensure the dam is 'fixed' in to the side and bottom of the ditch it is essential the ditch dimensions are known to allow the dam size and piling lengths to be calculated. Some dams may require additional strengthening by installing a fixed brace on the downstream side (wood or plastic rails/posts). Some dams are adequately supported by using locally borrowed peat placed behind the piling.

Plastic piles are made of recycled plastic and are only supplied by a limited number of companies. Each company has a slightly different design but as a general rule the pile is about 300mm wide, with a thickness of 5.5mm and they can be cut to any length (up to 16m). As a general rule piling dams will not be deeper than 6m as this becomes a very large dam and other engineering principals will be required. Each pile connects to the next one using a circular clutch to interlock. The ultimate aim of a plastic piling dam is to raise water levels and push water out of the ditch to the sides, thus reversing the drying effects of the ditch.

Plastic Piling Location

The location of the dam will determine the exact width and depth of the dam, and give an indication of how deep to place the piling. The installer needs to examine the ditch and surrounding ground, looking for cracks in the peat that runs parallel to the ditch. The dam needs to extend outwards beyond the ditch sides and any side cracks, to ensure water does not flow around the dam. The ditch width and depth is measured and from this the size and number of pile can be determined. As a general rule the length of pile should be up to $1^{1}/_{3}$ to 1½ deeper than the ditch depth and go beyond the bottom of the ditch. This ensures water does not go under the piling dam.

Typically, the plastic piling will be spaced 8m – 15m apart, but this depends on the gradient of the ditch (the steeper the gradient, the closer the dams need to be). On some slopes, spacing should aim to allow for a fall between dams of about 30cms but this may not always be possible. If the peatland site is located on shallow peat, where the piling may interact with the underlying substrate, there may be a requirement to determine if the piling will drive beyond the ditch bottom. Some locations the substrate is not suitable for using plastic piling.

Installation Procedure

Depending on the size of the piling dam the installation can be undertaken by hand or using mechanical methods. Small piling dams are usually installed using hand held rubber mells. Larger piling dams are installed using excavators or specialist piling driver equipment.

Hand or manual installation

- Using a spade, the line of the piling dam is dug by cutting the peat vegetation to create a slit for the piling to drive through. It is important the piling dam is installed across the ditch and 90 degrees to the ditch sides. To ensure the dam line is in the correct location a pole or wooden beam can be used to create a straight edge. For some dams the use of a piling guide (channel to ensure the piling creates a straight dam) can be used.
- Starting in the centre of the ditch the first pile is inserted by hitting the top of the pile with a rubber mell (or metal mell using a piece of wood over the top of the pile). The mell should hit the top of the pile at the centre, ideally where the pile kinks, as this is stronger.
- Drive the pile in to the ditch but ensure it is level on both top and the side by using a spirit level. Ensure the first pile is only driven in so as leaving it high (about 30cm above the ditch sides) this to allow for alteration with the levels but also assisting with the installation of the next pile. The final level will be lower than this height.
- Interlock the second pile by connecting the ‘clutch’ ends and ensuring the correct end is connected. Some dams are installed in a ‘Z’ or ‘S’ shape while others create a ‘C’ shape. The design of the piling shape should be determined before installing.
- Once the second pile is driven in to the level of the first pile continue to add piles as per the designed width. The piles should be driven wider than the ditch edge and past any side ditch cracks. The overall width is to be determined by the installer but it is essential the dam is wide enough and deep enough to stop water loss.
- As a general rule the pile depth is twice the depth of the ditch and the dam width is about 50% wider than the ditch width.
- When all the piles have been installed to up to temporary height, all the piles are driven in to the final height, usually 10cm above the ditch sides. As a general rule the piling will be set against the side of the ditch which is higher. It should be noted that when driving the piles to the final level it is usual to do one pile at a time and looking out for any piles which ‘nip’ the other causing two to move down. This can be rectified by hitting the opposite edge and being careful with the down force.
- The final dam is finished with all the piles being set at the same level and the top being reasonably level (where conditions allow). The finished dam will restrict water flow with the aim to push water around the dam edge. Where the piling dam is located at the end of a ditch, and where water flow needs controlled, the final option may involve creating a sluice. This involves knocking down the centre pile a further 5-10cm lower than the other piles to ensure water flows through the middle of the ditch.
- Usually small pile dams are not supported but there may be a requirement to install a wooden or plastic support brace.

Mechanical installation

The procedure for installing large dams follows the same design and process as above. The size of the piling may need the use an excavator/specialist pile driver to install the plastic piling.

- For large ditches the excavator should lightly scrape out the bottom and ditch side vegetation. It is essential the excavator does not dig too deep in to the ditch side especially beyond any side cracks.
- The vegetation removed from the ditch should be stored to one side for use later.
- The excavator digs down in the centre of the ditch only to ensure the first pile can be driven in to the bottom of the ditch.
- If the dam is very wide, a piling guide may be necessary (placed over the top of the ditch) to keep the piles straight and assist installation.
- The piling should be installed as per the manual procedure but there may be a requirement to hold the long piles with a guide. The mechanical installation often requires covers for the piling and these should be fitted as per the machine being used.
- When the plastic piling has been installed there may be a requirement to install a support structure. This provides additional support and can be a wooden/plastic brace or borrowed peat placed behind. Some design options allow for using both.

Fig. 1

Interlocked plastic piles, here seen with a wooden brace to provide extra support. The finished height of the piling is about 10cm above the ground level

NOTE: the piling extends into the ditch side to seal off any cracks and provide strength. The ditch water rises to flow over the end of the dam rather than over the centre section

Fig. 2

Finished large plastic piling dam with both wooden brace and peat used to provide support and landscape the dam in to the surrounding land. This large dam is 6m wide and 5m deep piles.

Fig. 3
Finished plastic piling dam with peat used to provide support and landscape the dam in to the surrounding land. The dam was wide at about 4m but shallow with only 1.5m long piles installed.

Machinery & Equipment

All machinery must be low ground-pressure tracked machines with a PSI below 3.5. Bio-hydraulic oils must be used and the machines should be clean and free of oil/fuel leaks. Some locations may require the use of bog mats to work on very wet ground. Specialist piling heads can be fitted to wide tracked excavators or simple metal plates to assist with driving in the piles. Each machinery will use bespoke piling guides or protection covers for the top of the pile. It is essential the tools or machinery chosen are fit for purpose and will reduce the impact on the pile by stopping the piles breaking.