Leaky Dams

Slowing the Movement of Water

Figure 1.
Naturally occurring dams

Description

Leaky dams occur naturally when large sections of trees fall into, and across the channel, holding back water during high flows. We can replicate these processes by building 'Leaky Dams', using a variety of different methods that utilise locally sourced wood, securely pinned in place.

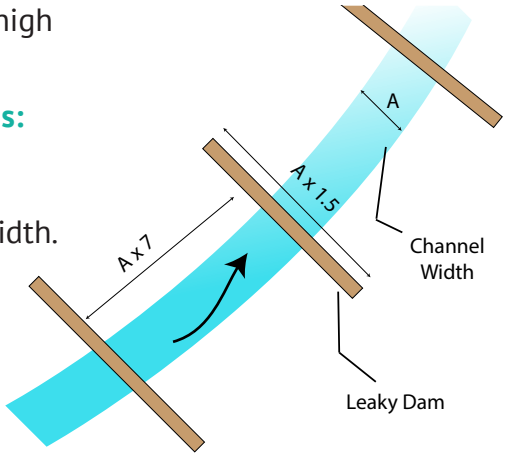
Design

There are several different types of Leaky Dams, this guide focuses on three different structures: Wedged Log, Leaky Boards and Natural Dams. All three are effective at slowing the movement of water during high flow events.

There are a few key rules to follow when installing any leaky dams:

1. They must be installed, as a minimum, in a sequence of 3.
2. The distance between each dam should be 7 times channel width.
3. The width of the dam should be 1.5 times channel width.
4. The structure should be set 300mm above base flow level.
5. Logs should be no more than 400mm in diameter.
6. Where possible, materials should be sourced locally.
7. Structures should be installed 90° to the flow.

PLAN VIEW



CROSS SECTION

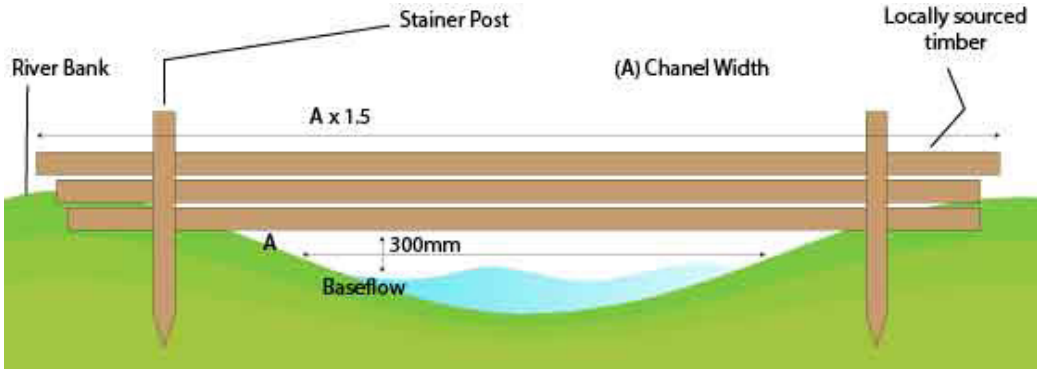


Figure 2.
Key rules for leaky dams

Leaky Dams

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Wedged Log

Estimated cost per structure: £150
(Assuming a minimum of 6 are constructed in a day)

Wedged Log Dams are the most complex of the three structures. Once locations are chosen, it is important to make a prior assessment of base flow level. A channel is then dug into both banks, opposite to each other, to a depth where the logs will sit 300mm above base flow. and 90° degrees to the flow. Four strainer posts are then driven into the bank, parallel to one another, at a width slightly larger than the maximum diameter of the timber used. Timber logs are then placed between the strainer posts. Ideally timber used should come from site, if not they should be sourced as locally as possible. Hardwoods such as Larch are good materials to use as they are hard wearing. The length of the timber should be at a minimum 1.5 times the width of the channel. Plain wire is then used to secure the timber in place and prevent them moving.

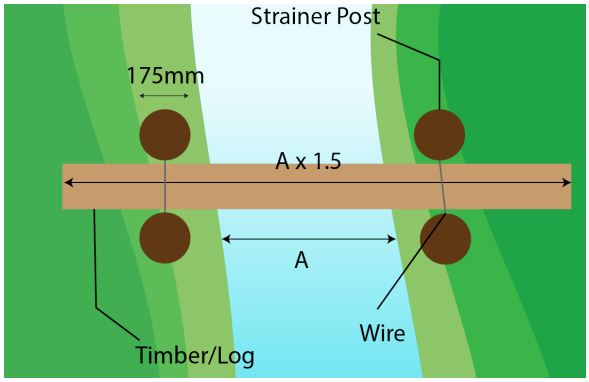

Figure 3.
Aerial View and example of Wedged Log Dams

Materials required:
4 posts, 750mm diameter, 2500mm length
3 Timber/logs, 1.5 times channel width
Plain wire and staples

Equipment required:
Digger and Operator
Fence post knocker
Hammer and fencing tools

Figure 4.
Leaky boards installed at Oughtershaw.

Leaky Boards

Estimated cost per structure: £50

Leaky Boards can be constructed by hand and are a relatively simple structure. They are best suited to small channels (sub 1m wide). Once again a prior assessment of base flow is required to determine the boards sit 300mm above base flow. Two posts are knocked into the toe of the bank. A small trench on each bank is dug, allowing the boards to sit into the bank at the correct height. The boards are secured upstream of the posts, making sure to leave 10-20mm gap between each board. Nails or staples can be used. The height of the structure should be positioned so that water is encouraged onto the floodplain during high flows. The boards should be 1.5 times the length of the channel width.

Materials required:
2 Posts; 900mm diameter, 1800mm length
3-4 Wooden boards, 50mm by 100mm.
Nails or Staples

Equipment required:
Fence post knocker or Mel
Spade
Hammer

Natural

Estimated cost per structure: £50

This is where you want to formalise existing, naturally occurring woody material, by securing them in place. Natural features are excellent, however, as they are mobile structures, they can be deemed as a risk. Therefore we can secure them in place to ensure they are fixed and will not cause any issues downstream. There are a number of ways to achieve this, including wiring, stakes, re-bars and hinging. There are several resources online that go into more detail, so please refer to 'Links and resources' for more information.

Figure 5.
Naturally occuring dams secured in place.

Maintenence (Low)

All these structures will require a level of maintenance to ensure that they do not cause issues further downstream. After each significant high flow event each structure should be checked for:

- Debris; any debris caught up behind structures should be cleared.
- Integrity; the dam should be checked to see if they are still structurally sound, boards, wires, stables might need to be replaced or repaired.
- Condition; over time some materials might loose condition, for example, wood might rot, therefore certain items might need to be replaced.

Consents

Consent requirements depend whether the structure is to be sited on MAIN RIVER or ORDINARY WATERCOURSE. River classifications can be checked on: http://maps.environment-agency.gov.uk/wiyby

If the structure is on a MAIN RIVER it will require **Environment Agency** consent, however some structures could be 'Exempt' and only need to be registered if they meet certain requirements.

If the structure is on an ORDINARY WATERCOURSE it will require consent from the **Local Authority**

Links and resources

NFM Measures- a practical guide for farmers (YDNPA): http://www.yorkshiredales.org.uk/__data/assets/pdf_file/0003/1010991/11301_flood_management_guide_WEBx.pdf
Rural Drainage Systems for Farmers: http://www.crew.ac.uk/sites/default/files/sites/default/files/publication/Rural%20SuDS%20Design%20and%20Build%20Guide%20December%202016.pdf
Countryside Stewardship- Small Leaky Dams (Natural England): https://www.gov.uk/countryside-stewardship-grants/rp32-small-leaky-woody-dams
Countryside Stewardship Higher Teir options (Natural England): https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/627361/cs-higher-tier-manual.pdf
Farming & Wildlife Advisory Groups (SW)- Flood Management Information- Leaky Dams: http://www.fwagsw.org.uk/wp-content/uploads/2017/03/Woody_Dam_Information_Sheet.pdf
River Restoration Centre- Felling and placing treesa for habitat- Natural features: http://www.therrc.co.uk/MOT/Final_Versions_%28Secure%29/5.7_Bure.pdf
The Wildlife Trusts- Managing Woody Debris in Rivers, Streams and Floodplains: http://www.therrc.co.uk/MOT/References/WT_Managing_woody_debris.pdf