



UPSTREAM MANAGEMENT

Upstream management, otherwise known as slow the flow, is a collective term for techniques used to manage flood risk and includes flood storage solutions as well as natural flood management (NFM). Upstream management is the alteration, restoration or use of landscape features to manage flood risk. One technique is using in stream structures.

IN STREAM STRUCTURES

In stream structures such as leaky woody dams, check dams and boulders can slow the flow of a river by creating a permeable space allowing water through, but reducing the amount of water in the stream during high flows. These structures can also encourage out of bank spill over which delays downstream peak flows.

Whilst maintaining banks and removing obstructions from rivers is sometimes essential to reducing flood risk, other times there will be certain areas in the channel where leaving obstructions such as fallen trees or adding in stream structures could have multiple benefits.

Wooden structures

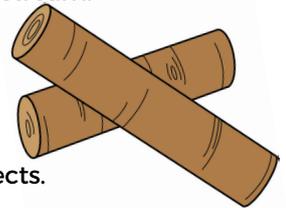
Leaky woody dams consist of trees or logs that fall or are manually placed into a rivers channel. These wooden structures can be designed with varying levels of complexity, from one or two pieces of wood placed across a channel to dozens of stacked logs secured to the bank. They begin to gather debris and create a permeable space that still allows the normal flow of water, but at a reduced flow rate during higher flows.

Benefits

- Reduces flow rates to delay floodwater flows downstream.
- Can create pools and riffles on the rivers bank which provide habitats for fish and aquatic insects.
- Slows the movement of silt and sediment downstream.

Boulders

Boulders can narrow the rivers channel, alter the direction of the flow of water, and increase channel meandering to slow the flow of water. Boulders can potentially alleviate downstream flooding as they are effective in collecting debris and gravel which prevents major build ups or blockages further downstream.



CASE STUDY: St. Helens Sankey Valley NFM

The aim of the Natural Flood Management project in Sankey Valley was to use hybrid woody dams to attenuate the flow of flood water into downstream Blackbrook and improve the habitat. The project was run in partnership by Natural Environment Research Council, St. Helen's Council, the Environment Agency and the University of Liverpool.



Issues

- Black Brook in St Helens has flooded three times since 2000 (2000, 2012 and 2015), with the last event on Boxing Day 2015.
- The brook does not function as a natural ecosystem and fails EU directives for natural conditions.

Solutions

- Four hybrid woody dams were built to retain rapid flood flows down the Stanley Brook tributary, before the flows arrived in downstream Blackbrook.
- Three dams were constructed as part of a project to restore Stanley Bank Site of Special Scientific Interest (SSSI).

- Construction of a fourth dam took place by the Environment Agency, giving an overall cost of £2,000 for the four dams.
- Modelling is being carried out to see if further measures (flood relief wetland, de-culverting and further catchment attenuation) will be effective.

Benefits

- Able to hold back 2,500m³ of flood water (equivalent volume of an Olympic swimming pool).
- Attenuate runoff and reduce flood risk and floodwater depth.
- Resulted in reduced phosphate and nitrate levels in Black Brook.