



## **Installation of Natural Flood Management measures and habitat improvements at Pott Shrigley**

### **Final Report**

#### **Project Outputs**

The outputs the project was required to deliver were:

- To help reduce the risk of flooding to six properties and infrastructure downstream in Pott Shrigley.
- The attenuation of 2,820 m<sup>3</sup> of water, above what would be on the floodplain in high flows. This would be achieved through the installation of 73 leaky dams, comprising 60 small dams; 10 medium and 3 large. A further 1200m<sup>3</sup> would be attenuated through tree planting above the watercourse.
- Monitoring of the benefits of the above interventions with a before and after photo programme and time-lapse monitoring
- Creation or improvement of 2.5ha of habitat consisting of 0.5ha of wet moss and 2ha of tree planting (4,000 trees).
- 1.5km of Bakestonedale Brook moving to GES or GEP as a result of the project.
- Creating an NFM demonstration project with community interaction, final monitoring and a project report.

#### **Leaky dams**

The initial output specified 73 leaky dams, to provide a cumulative attenuation of 2,820m<sup>3</sup> of water. Ground conditions encountered whilst installing the dams led to only 68 dams being installed, but these provide a total attenuation of 3,058m<sup>3</sup>. The lower total number of dams was compensated for by a greater number of large dams being installed. The initial output specified 3 large dams, but 10 dams longer than 20m were installed, which helped deliver the higher level of attenuation.

#### **Section 1:**

The first 6 leaky dams were built on the parcel of land immediately upstream of the industrial estate which has previously flooded. Locally grown osier willow (*Salix viminalis*) was chosen as there were no trees in this area. A mixture of sizes of willow were planted to provide variety of shapes and sizes and ensure protection from grazing.



A deflector was built next to Dam 5 (pictured) to protect the downstream area from erosion and redirect water towards the leaky dam during high river levels.

### **Section 2:**

10 Leaky dams were built to hold water in the flat wet parts of this section. All dams were planted with goat willow (*Salix caprea*) harvested from this section. Site 17 was going to be the site of a leaky dam but a tree had fallen down a steep slope into the watercourse where it is effectively slowing the flow of water and, due to the position of the tree, it would not have been safe to try and reposition it. As such, its effect is being noted and it will be monitored to make sure it does not shift and interfere with the nearest structure.



### **Section 3:**

Six leaky dams planted with goat willow harvested from this section. The large bowl formed by a bank which formed an old track and bridge foundations was planted with an extra 400 goat willow cuttings.



**Section 4:**

4 leaky dams were installed and planted with goat willow harvested from Section 3.



**Section 5:**

12 leaky dams were installed and planted with goat willow harvested from this section. Larger dams were built to cover the flat, wetter sections of the valley.



**Section 6:**

9 leaky dams were built and planted with a mixture of goat and osier willow.



**Section 7:**

12 leaky dams were built and planted with osier willow.



**Section 8:**

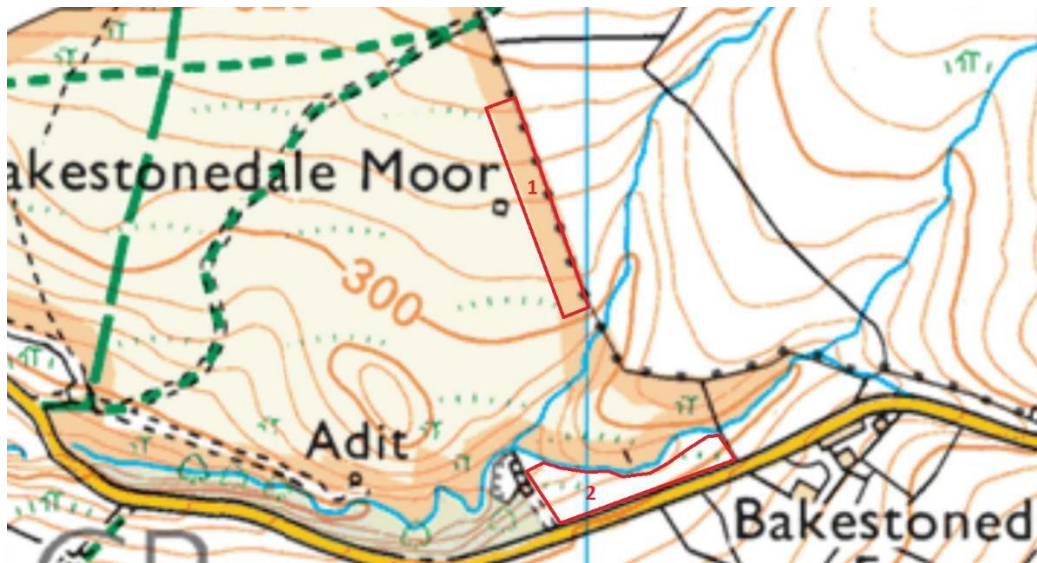
8 leaky dams were built and planted with osier willow. This area included very wide, wet sections so larger dams were built to capture water in the full width of the valley and to spread water out over the dense reeds which were naturally growing there.



### **Habitat creation and improvement**

The planting of 4,000 trees and formation of two new shelter belts totalling 2ha in area on previously grazed land will reduce water run-off from heavily-grazed upland and provide habitat and food sources for invertebrates, birds and mammals. The areas which have been fenced contain no bracken and the fencing will protect the area from stock, allowing ground flora and shrubs to grow between the new trees. Due to the high grazing density on the upper moor there is very little natural regeneration of the few existing trees, so these trees will add significantly to the biodiversity of the upland.

The areas of tree planting are shown in the maps below.



Goat willow and osier willow have been planted in and alongside the dams and in some wetter areas to slow water during high river levels, to create feeding and shelter opportunities for a variety of animals, and to act as a pioneer species, creating enough shelter to allow other plant and tree species to move in.

Areas of bog have been extended behind several dams by extending dams wider (10 dams are more than 20m wide) than the channel where water normally flows. This increases the bogs' water holding capacity during high river levels, prevents direct run-off during rain, allows the area to stay wetter for longer, and catches debris from vegetation to allow for the build-up of soil. Over time this will allow regeneration of moisture-loving plants to colonise the area. Areas between dams with varied bog-dwelling plant life have been left unplanted with willow to allow light in. The untreated timber of the log dams themselves will act as fallen deadwood, providing food and shelter to a variety of invertebrates, as well as catching and holding woody debris from upstream.

### **Watercourse enhancement**

1.5km of Bakestonedale Brook will have been enhanced through the reduction of speed and energy in water flow during high rainfall events, resulting in less silt moving downstream and a reduction in erosion. The leaky dams also increase the diversity of habitats within the channel through slowing the flow and allowing for the creation of pools and areas of slower moving water which provide habitats for water invertebrates to feed and breed and water plants to grow.

The willow planted in and alongside the leaky dams will take up nitrogen from the stream and run-off from the moorland and will reinforce and eventually replace the dams when they reach the end of their expected lifespan.

### **Monitoring and reporting**

Monitoring will take place for two purposes: maintenance, to ensure the dams remain in sound condition and are functioning effectively, and performance, to assess whether the dams are delivering the level of attenuation for which they were designed.

Maintenance visits will take place in early summer each year to assess whether the dams require repair or strengthening following the heavier rainfall of the winter months. The timing of these visits will allow for maintenance to take place over the summer months when ground and weather conditions are better and water levels are lower.

Monitoring of the dams' performance will take place during heavy rainfall events using video and still photography:

- Positioning of a camera on selected dams to take time-lapse photographs to show water levels above and below the dams
- Video of the water flows above and below the dams
- Photographs of measuring gauges in the water above and below the dams

Monitoring will be led by Mersey Rivers Trust staff with support from local River Guardians; there has been significant local interest in the project and we intend to enlist local residents in the monitoring programme.