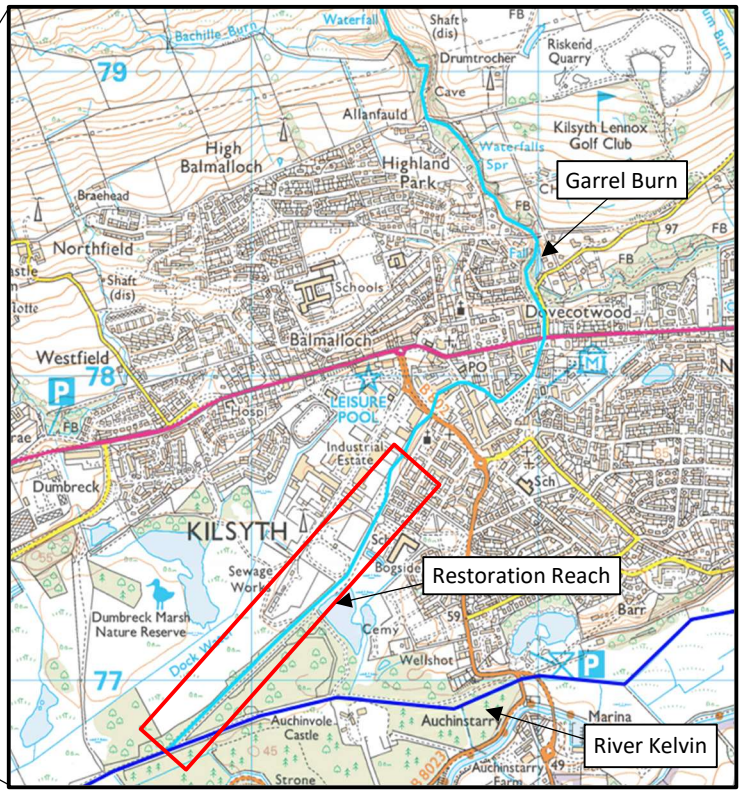
Case Study: *Remeandering and the Garrel Burn*

Location: Kilsyth, North Lanarkshire
Water body length: 9.18 km
Project Lead: North Lanarkshire Council
Project completion date: March 2022
Funding: SEPA WEF, Scottish Government, North Lanarkshire Council
Restoration: 600 m of re-meandering plus, two 'pre weir' fish ladders

Location Map of Garrel Burn



The restoration area is located within Dumbreck Marsh which was a 'brownfield' wetland area which developed naturally on post-industrial land in the mid/ late 20th Century. The area was once heavily used for colliery activities and mineral railways. After the decline of the colliery industries the land was left fallow and gradually accommodated wetland habitats and associated species. However, in recent years there has been a decline in species diversity due to the wetland drying out.

Pre-restoration condition of the Garrel Burn

Project Description

Historical mapping shows the Garrel Burn was realigned and straightened over 250 years ago during either 17th or 18th century creating an incised, simplified channel which was disconnected from its floodplain and lacking in morphological and habitat diversity. This was further enhanced by frequent dredging and embankment construction. Further to this, two weirs located within the river at Kilsyth prevented access to over 1.5 km of quality habitat to migrating fish (eel, trout, salmon, lamprey).

A new 600 m meandering course with alluvial bars, riffles and pools was constructed within Drumbreck Marsh. Large wood structures were placed in the channel at the apex of the meander bends to increase flow diversity and kick-start morphological evolution i.e., encourage pool and alluvial bar development. The restored channel is connected to its floodplain, restoring a more natural flood regime and that will encourage the reinstatement of the marshy floodplain.

The project also included the construction of two "pre-weir" fish ladders below the weirs within Kilsyth town to improve fish passage.

Design

The restoration approached aimed to work with natural river processes as much as was feasible. However, the low energy nature of the site and land contamination constraints meant an 'active intervention' restoration approach (i.e., where a new river channel is constructed and land is actively moved) was required to restore the channel's natural character and function i.e., low energy meandering channel. The longitudinal geometry of the channel bed was shaped to create pools, riffles and alluvial bars and the bed material was sized (based on modelled data) to ensure that it was mobile and that natural sediment transport processes could still operate.

Upper 200 m of channel

Land contamination and below ground utilities meant the upper 200 m of the new channel had to be fixed and was covered with a geosynthetic clay liner. To ensure the linear was effectively 'activated' (i.e., covered with 300 mm of fill) and protected from erosion, the topsoil that makes up the banks was placed on the liner and covered with a biodegradable geotextile and the lower 1/3 of the banks covered with quarried stone on.

Lower 400 m of channel

In the lower reach all constraints to lateral adjustment have been removed to allow the channel to adjust naturally to its restored flow and sediment transport regime. Large wood structures were added to provide a catalyst for natural channel evolution, especially greater pool and gravel bar development. The channel banks along this section were also lined with a biodegradable geotextile to protect them from erosion while vegetation established.

Upper reach of restored channel during construction showing clay liner.

Lower reach of restored channel showing bar apex large wood structure during construction.

Restored Garrel Burn channel in April 2022.

Drone footage of the Garrel Burn in March 2022, immediately after construction was complete.

Post-Restoration

Post restoration the habitat complexity of the site has improved through the creation greater diversity of geomorphic units and bed complexity (even in the upper reach where lateral adjustment is restricted). The large wood structures not only assisted in increasing morphological complexity but also provides good habitat for trout.

The new channel has a more natural geometry (i.e., the design flows top its banks every 1.5 to 2 years) significantly improving floodplain connectivity. The more frequent flooding and migration of flood waters into wetland areas aims to further improve floodplain function and subsequently increase habitat diversity. Further to this the more appropriately sized channel encourages a more natural sediment transport regime as there is a better balance between upstream sediment supply and sediment transport capacity helping to sustain in-channel habitat complexity.

The potential for fish to migrate upstream has been significantly improved through the construction of the two pre-weir fish ladders downstream of the two historic concrete weirs.

Completed pre weir to improve fish passage in November 2021.

Wider Project Benefits

The project has delivered a range of wider habitat and community benefits including greater access to greenspace, over 2 km of improved footpath networks, three new footbridges to improve access, wetland areas to improve floodplain habitat along with bird boxes and a sand martin wall.

NORTH LANARKSHIRE COUNCIL

wef Water Environment Fund

SEPA Scottish Environment Protection Agency