

18th Century Barrow Weirs

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Picture a scorching summer day, deep in the Barrow valley, where the very best places to swim are in the deep pools just above the weirs. For years we have gently parked the boat up against one of the infamous “unguarded weirs” where, held in position by the water flow, we can now step out on to the massive masonry structure and enjoy the cleansing pleasure of diving into the shocking depths; or we can just sit on the crest blocks, legs cooling in the water, soaking up the sun and invigorated by the negative ions produced by the falling water running down the back slope of the weir.



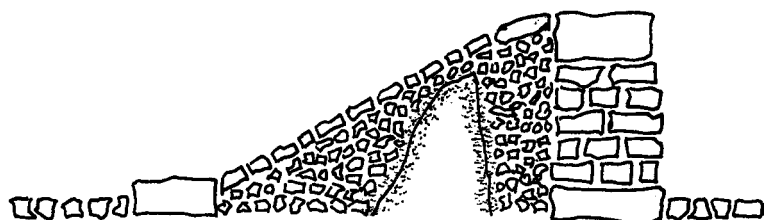
Ballyellen nosed up against Clashganna Weir, crew cooling off in the Barrow (John Sexton)

I know each weir on the Barrow, and its pool, from this hedonistic perspective, but let's look at the engineering involved. These mighty masonry weirs have stood for over two hundred years with very few failures and little maintenance necessary. The men who designed and built them got it right, because they were applying knowledge and skills of materials and hydraulics that are recorded back to Roman times; the techniques used in construction had changed little. First came the surveyors whose experienced eye read the landscape, the levels, the shallows, the solid ground and the location of resources of limestone, timber, gravel and clay. The engineers calculated stresses and quantities, designed bridges and locks and weirs, and recorded everything in two dimensions on paper. The contractor priced and tendered and recruited his workforce and the juggernaut started rolling along the valley, modifying every yard of the river with manmade structures.

Each weir is a dam that raises the water level upstream to sufficient depth to permit navigation. The dam is constantly overtopped by the river-water along its full length and must withstand the hydraulic pressure of flowing water on its upper surface, as well as the static water pressure on its vertical upstream face. The eroding action of the flowing water is resisted by the masonry cladding: shaped and fitted into place with true craftsmanship, this rock armour stands up to winter floods tearing at the crest and the scouring action of the turbulence down at the tail of the back slope.

The mass of the structure resists the static water pressure, so the whole weir must be firmly anchored into the river bed over its full length, and the ends seamlessly tied into the river bank to resist erosion. We can only see the exposed tip, and without dismantling a weir we can only make an educated guess as to the actual core construction.

Possible crosssection through 18th century masonry weir on the Barrow. Centre core of puddled clay, surrounded by gravel and stones, a substantial masonry wall facing upstream and stone cladding on the back slope, all anchored in clay on the river bed, with stone protection upstream and downstream.



It is likely that the whole structure is bedded into impervious puddled clay on the river bottom, the section of river bed both upstream and downstream of the weir being protected from erosion with masonry for some distance out from the weir. The centre of the core is probably impervious clay again to prevent seepage, this core in turn being protected by layers of gravel and stones, which provide the main mass of the structure, needed to hold it in place. The outer cladding required the skill of the mason, selecting and shaping large stones, fitting them in place with precision and care that has withstood the annual cycle of flooding for two centuries. Heavy crest blocks face the winter torrent on the top of the upstream vertical wall, the stress being carried back down the supporting masonry to the huge horizontal blocks at the tail, which also divert the water out horizontally to reduce scouring of the river bed below the weir.

Remember that all this work was done by manpower backed up by horse and cart and tripod timber shearlegs, with block and tackle to lift the heaviest masonry. All the materials had to be sourced as near as possible to each construction site and the work had to be completed quickly during low summer water levels when the river could be diverted. Each site must have been a mighty spectacle, with large numbers of labouring men and boys and horses, carpenters and riggers, masons and blacksmiths, and a "powder man" assembling blasting charges in his hut a safe distance from the site: the whole enterprise directed by a top-hatted engineer and a tough foreman, supported by cooks and suppliers of food and firewood. Close by must have been sleeping shacks and kitchens surrounded by wood smoke and drying lines, stables and harness menders and tool repair men, and the inevitable comfort women who probably cared well for the men both in and out of bed.

So next time you approach a weir on the Barrow during summer, nudge up against it, step on it and marvel at the men who built it. Then, when you push off and continue navigating, look out for the submerged "summer weirs", each a rough line of big boulders, located between boat stream and far bank, positioned between locks to help maintain water depth over the lower cill of the next lock upstream. There are fine examples of these submerged weirs between St Mullins sea lock and Carriglead lock, and between Clashganna lock and Ballinagreine lock. Only obvious at summer water levels, there is a visible rise in water level upstream of these structures and strong current in the boat stream as you pass between the end of the submerged weir and the tow path. So don't curse the big boulders in the river: without them we'd get stuck on the lower cill going into and out of the locks. The 18th century engineers had subtle ways of maintaining depth and training the river, simply by placing boulders in the right position.

The combined effort of these construction crews produced not only the finest quality civil engineering, but also structures of great strength and grace. The long run of wall, reaching north from an island, then gently curving into the bank, merging with the land, creates a lake and a cascade, a feast for the senses. Revitalising the river with oxygenated water, it provides the haunt of otter and heron and fly fisherman, dipper and kingfisher, the thrill for canoeists, the inspiration of painters, and the delight of all who walk by. All this so that boat loads of barley and wheat, coal and stout, could be drawn by horses plodding along the track-line from town to town, creating wealth and prosperity in this wonderful valley.

