



## Water / Nature: Pond creation for sustainable drainage

### Torphin Hill Golf Club

#### THE CHALLENGE

Torphin Hill Golf Course is located within the Edinburgh Green Belt. It is built essentially on two levels, the lower part of the course being fairly agricultural and the upper part more moorland in character. On the lower part of the course, space is particularly tight in golfing terms, with little opportunity for grassland or other habitat expansion beyond small pockets and narrow strips of rough associated with some of the small scale tree planting. A burn runs on the course boundary within in a rich corridor of hawthorn hedging and drystone wall/dyke. The burn not only provides some habitat value in itself but also an ideal opportunity for pond creation at three wet points along its 300 metre length. Having already enhanced the landscape and habitat value of the course through tree and shrub planting, gorse, grassland and bracken management, and restoration of drystone dykes, the club was delighted to add to its portfolio of environmental stewardship in this way.

#### THE SOLUTION

Of the wet areas one was in play and one out of play. The club's preference was to start with the one on the par three 17<sup>th</sup> where an elevated tee shot plays down over the managed burn. Although test pits and the greenkeeper's instincts were that the clay content of the soil would hold water naturally, it was decided that, despite the extra cost, the risk of a muddy hole in the middle of the fairway was sufficient to merit lining the pond, as shown in the image below.



A consultant produced a final design for the pond construction which formed the basis of labour and material costs from a construction company and supplier. As a condition of the contract, Torphin Hill Golf Club require the construction company to work in compliance with all relevant health and safety and other

regulations, and that they present a copy of their current products and liabilities insurance cover (typically £1-2 million) prior to commencing works.

Freshwater shrimps were present in the water supply suggesting good water quality. On the basis of this low pollution risk, it was decided to create an on-line pond. The burn was temporarily diverted through piping during pond construction. A shaped hollow was dug outwards from the burn-line to create varied depth and shallow sloping edges but of a size to enable a single piece of liner to be used, thereby avoiding joins and overlaps. The hollow was blinded with old carpet, recycled from members, to prevent stones piercing the liner. The butyl liner was rolled out and settled into place by team of enthusiastic volunteers. An outlet pipe was positioned to maintain and control the water level, round which the trimmed liner was strapped with huge amounts of waterproof adhesive tape. Rumbling stones were positioned to introduce aeration before entry to the pond. An earth bridge created a small holding pool before the inlet, to encourage the pre-settlement of any silt and control inflow rates into the pond. The liner was then covered with soil to the planned water level and the burn water redirected from the temporary piping to the pond, which filled up in less than 24 hours. Marginal planting and wildflower sowing was carried out along 50% of the pond edge, on the burn side, with the 50% on the fairway side mown to the edge for golfing reasons. The cost of constructing the Upper Pond was £5,000, of which 100% was acquired through grants via the Edinburgh Green Belt Trust (now called Edinburgh & Lothian's Greenspace Trust [www.elgt.org.uk](http://www.elgt.org.uk) )

As test pits had shown the out-of-play wet site to hold water well all season, whilst the digger was on site for the first pond, it was decided to spend a couple of days creating a simple unlined pond at that location. It was so successful, that the following year the pond was extended to 20x12metres with a small island and planted up with a range of marginal, floating and emergent plants to complement those already present at this naturally wet and previously unmanaged site, resulting in a species rich mix including purple loosestrife, flag iris, reeds and sedges, juncus, flatleaved pond weed, waterlilies, lesser spearwort and water starwort amongst others.

The cost of constructing the pond was £6000 which was provided by EGBT, plants were supplied free of charge from Boghall pond by the Pentland ranger Service 9 ([www.edinburgh.gov.uk/phrp/rangerservice.html](http://www.edinburgh.gov.uk/phrp/rangerservice.html)). Some of the club's long standing members worked as volunteers on the project to keep costs down and to encourage education and communication.

## **THE OUTCOMES**

This pond creation project not only resulted in a complex of related open water bodies but in an opportunity to compare the technical, practical, cost and performance characteristics of different construction and management methods, and the implications of golfing considerations on these.

**The Out of play pond** has been the most successful pond by far, becoming highly naturalised within two years and looking superb from the clubhouse. Several species of damselfly, including the large red, an Edinburgh LBAP species, were using it within the first year. Its diverse aquatic and peripheral vegetation provides superb habitat particularly for invertebrates; moorhens, frogs and newts breed annually. There have been no management problems with this pond so far although phragmites will require controlling soon. Initially, areas to be cleared will be cut below the winter water level in attempt to drown them which will hopefully avoid the need for a long-reach digger. Water quality has always been good, with no algal build-up. The club has been considering enhancing the pond with additional shelves, indents and recesses along some edges. Being out of play and having no liner gave free rein to vegetation which has paid off for biodiversity.

**The in play pond**, although by no means a failure, this more expensive pond has been much more problematic. Inflow and/or fluctuating water tables caused the liner to "hippo" up early on, requiring repeat weighting down. The pipe outlet has also proved to have too small a bore, as following heavy rain, the pond overfills, flooding the surrounding playing area. Plant establishment has been both restricted by golf and the liner, although unfortunately Canadian pondweed has established and now severely dominates the pond. Ironically, this has provided good habitat for newts, making the issue of its control highly sensitive. Another recurring problem has been that despite a well oxygenated water supply, shallow water rapidly heating up over the black liner during summer, causing heavy algal growth most years. Experiments have shown that when barley straw is aerated and placed inside sausage-shaped nets that float in the water, a natural chemical is released which controls the algae but does not harm other life forms in the pond. Such problems highlight the need to consider forward planning in terms of a 5 year habitat management plan for new ponds. This allows the club to budget and plan for any unforeseen problems.



*Pond during construction*



*Pond as it is in 2010.*