Pond complex creation at Eye Landfill, Peterborough

MILLION PONDS PROJECT
Pond Conservation

A 50-YEAR PROJECT TO CREATE A NETWORK OF CLEAN WATER PONDS FOR FRESHWATER WILDLIFE

A case study to illustrate how best practice pond design principles can be applied to compensation schemes for protected species.

1. Background

The Eye Landfill site near Peterborough, operated by Biffa Waste Services Ltd, is located on old sand, gravel and clay workings. Following the cessation of quarrying some 20 years ago, part of the site was used immediately for landfill, whilst another part of the site was left without significant disturbance, and subsequently developed into a diverse mosaic of habitats, including ponds (see Figure 1).

Biffa had planning permission to extend the operating landfill area to the rest of the old quarry, but a condition of this required Biffa to undertake ecology surveys of the terrestrial and aquatic habitats prior to the landfill extension. These surveys were conducted by Golder Associates (UK) Ltd in 2007.

Eight ponds of various sizes were due to be infilled as a result of the permitted landfill operations, and these were surveyed for great crested newts, water voles and aquatic invertebrates. Three of the ponds were found to support great crested newts and rich aquatic invertebrate assemblages, and two of those ponds also supported water voles. Grass snakes, which hunt amphibians in ponds, were found across the site.

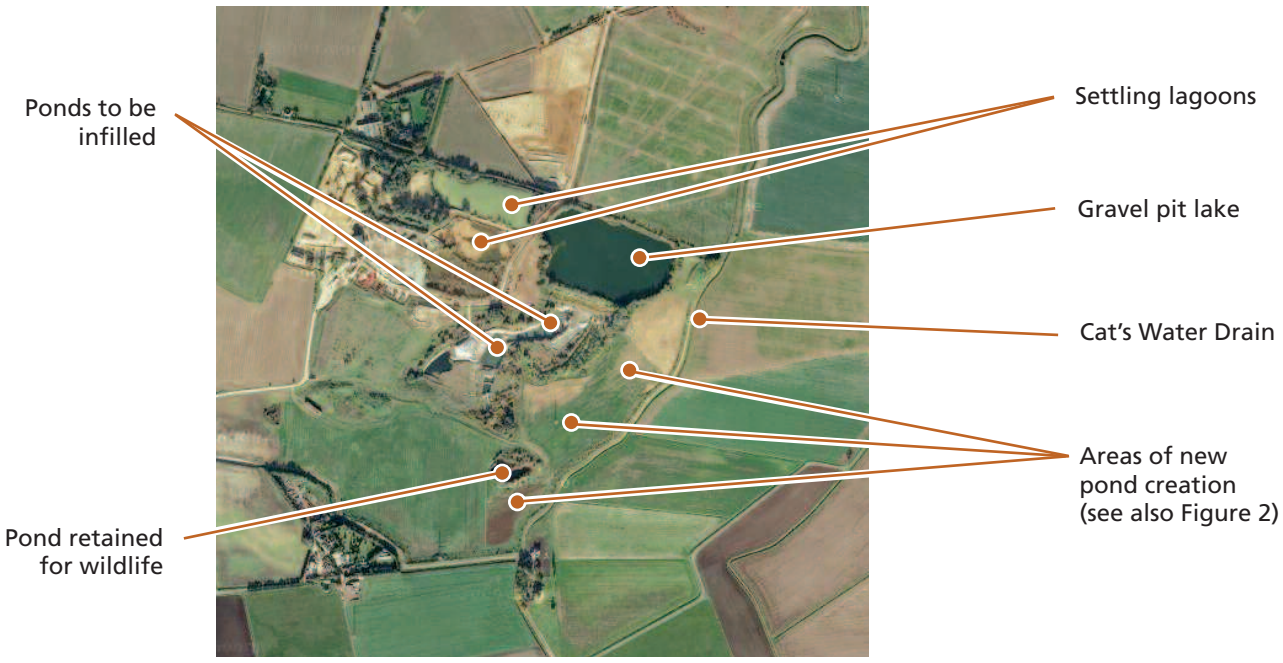

Figure 1. Aerial view of Eye Landfill, taken before the habitat creation scheme commenced in 2008.

Great crested newts, water voles and grass snakes are all protected under UK wildlife legislation and are also UK Biodiversity Action Plan (BAP) priority species. In order to mitigate the removal of eight ponds from the site, there was a need to develop an ecology mitigation plan, which would include compensatory pond habitat (see Figure 2), to allow the permitted landfill operations to continue at the site.

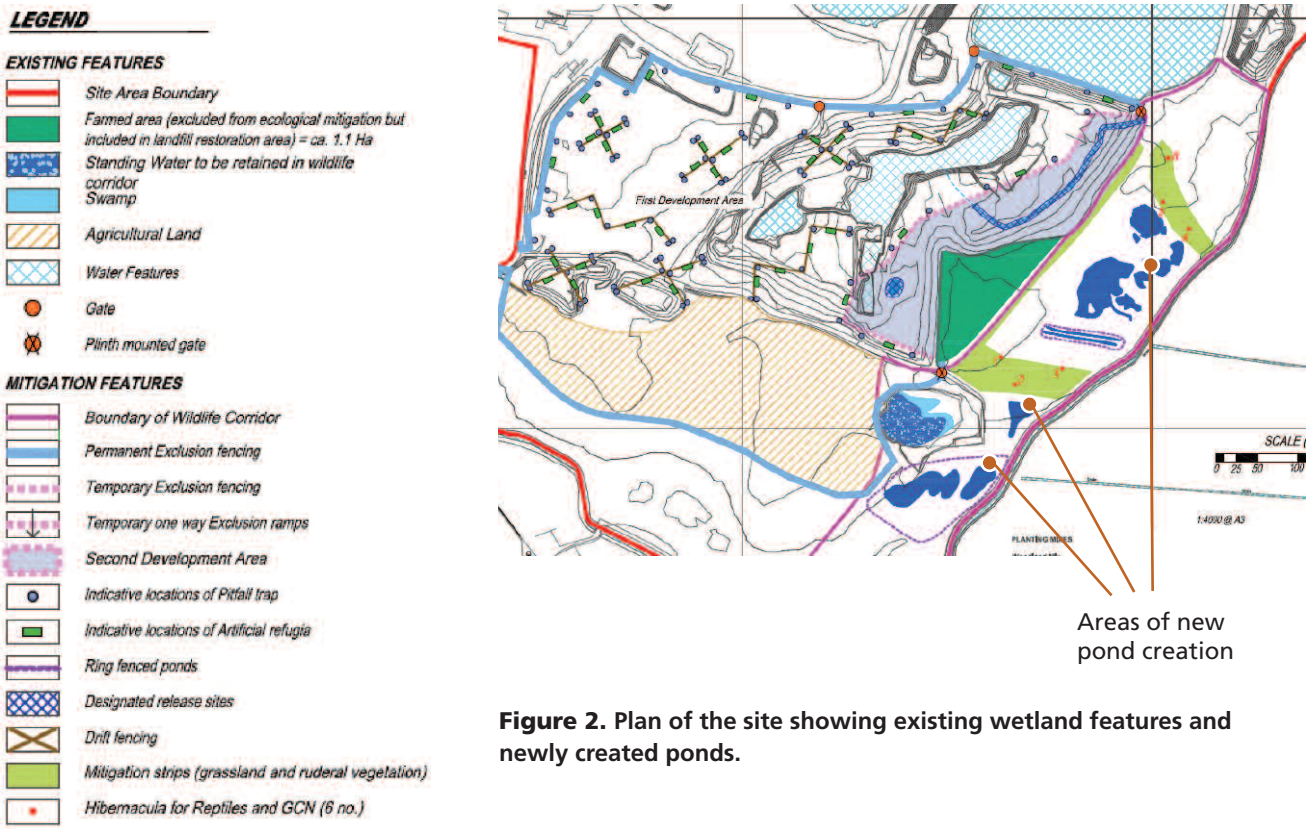

Figure 2. **Plan of the site showing existing wetland features and newly created ponds.**

2. Ecology mitigation plan

The ecology mitigation plan included three main components aimed at compensating for the impact of the landfill operations on the ponds and their wildlife:

1. The development site boundary was moved to avoid the infilling of the southern pond, which supported the greatest diversity of wetland associated flora and fauna.
2. To compensate for the loss of the seven remaining water bodies at the old quarry, and the loss of terrestrial habitats, Biffa secured 11 ha of arable land adjacent to the development area, where new wetland and grassland habitats could be created to offset the loss of existing habitat and where great crested newt, water vole and grass snake could be translocated.
3. An innovative forward planning approach was devised which split the development scheme into two distinct Phased Development Areas. The ponds which did not support great crested newts and water voles were to be infilled during the First Development Phase. The ponds which did support great crested newts and water voles could be infilled during the Second Development Phase at least 4 years later, once compensation habitat had been created.

This approach meant that compensation ponds and terrestrial habitat for great crested newts and water voles could be constructed well in advance of the translocation schemes and allowed to mature, via natural regeneration, for at least 4 years before translocation.

3. Overview of the habitat creation scheme

A pond complex of around 20 waterbodies of various sizes, depths and shapes was constructed in autumn 2008 (see Figures 3 and 4). The geology of the site was varied and consisted of sand, gravel, clay and peat. This provided an opportunity for creating both surface water and groundwater fed ponds. Overall, a wide range of pond types was created at the site along a permanence gradient (from temporary to permanent) to maximise the benefits for biodiversity.

The new wildlife ponds were designed primarily for great crested newts and water voles, but they incorporated a range of features that will benefit other pond wildlife. Water sources for the ponds are clean and unpolluted (groundwater and clean surface run off), favouring the many threatened pond species that require good water quality. Shallow margins and extensive drawdown zones were created to provide habitat for aquatic invertebrates, aquatic plants and wading birds, and in some ponds south-facing sand cliffs were constructed for nesting sand martins and burrowing bees and wasps (see Figure 4).

The ponds have not been planted up – all have been left to colonise naturally. This helps provide a habitat for the many pioneer species, some of which are now rare, which require the bare substrate provided by new ponds (such as stoneworts).

The scheme also included the creation of important terrestrial habitat features including hibernation sites for amphibians and reptiles (see Figure 5) and wildflower grassland corridors to allow animals to move from the Second Development Phase to the newly created wetland and grassland habitats.

The created pond complex fits neatly within the wider landscape, which includes other freshwater habitat nearby, including an adjacent stream known as Cat's Water Drain, and a series of lakes and settling lagoons situated to the north and west (see Figure 1).

Figure 3. Newly created ponds at Eye Landfill.

Figure 4. Ponds were created with gently sloping margins and extensive drawdown zones, and some ponds incorporated steep sand cliffs for sand martins and burrowing insects.

Figure 5. Hibernation habitat was created for amphibians and reptiles.

4. Pond complex design

Target species

The primary target species were great crested newts and water voles. The pond complex created on the site provides suitable breeding habitat for great crested newts. Ponds have been created with shallow water areas, which will allow diverse marginal vegetation to develop, providing egg-laying sites and shelter for developing newt larvae. Great crested newt populations fare best in areas of high pond density combined with suitable terrestrial habitat, where newts can hunt invertebrate prey and find shelter. In addition to the pond complex, the mitigation scheme involved the creation of terrestrial habitat for great crested newts including hibernation sites (see Figure 5), rough grassland and grassland corridors.

Water vole habitat was created by building two long linear ponds in parallel (see Figure 6). Pockets of excavated peat were deposited in patches on an island between the two linear ponds to provide water voles with burrowing habitat. A year after the pond creation works, marginal vegetation had already colonised these peat pockets on the linear ponds, which will provide water voles with foraging habitat and protection from predators.

Figure 6. Linear ponds created in parallel that have been designed for water vole.

Pond surface area

The scheme includes a wide range of pond sizes: the largest ponds are some 60 m by 60 m (c. 0.25 ha), whilst the smallest ponds are the 'one bucket ponds', which are around 1.5 m by 1.5 m (c. 2 m^2, see Box 1).

The larger ponds were created in the northern part of the wetland habitat creation area, which is mainly clay. The southern part of the wetland creation area is mainly comprised of sands and gravels, grading into peaty subsoil, and here smaller ponds were created, to maximise the opportunity to create a large wetland scrape for wading birds and waterfowl, amongst other wetland plants associated with the peaty substrate.

Box 1. One bucket ponds

Lots of 'one bucket ponds' were created as part of the pond complex. The idea is to excavate one digger bucket of spoil (approx. 1.5 m x 1.5 m) and dump the spoil next to the new excavation.

This creates an undulating 'moonscape' with bumps, craters, lots of small pools and lots of small-scale diversity. The resulting pond shape is a pool with one steep edge and one shallow sloping edge. The dumped spoil next to the pool provides basking habitat for reptiles, dragonflies and other invertebrates.

A one bucket pond with spoil heap immediately after construction (above), and 9 months after construction (below)

Pond depth

The pond depth ranged from a few centimetres up to 3 m deep (at winter high levels). The deeper ponds are designed to retain some open water during dry summers. Some of the larger ponds were designed to have distinct 'basins' which become separate during low water levels and provide further habitat diversity.

Geology and hydrology

Because of the range of depths, surface areas and substrates, the new ponds include permanent, semi-permanent and temporary waterbodies. The ponds created on sand have relatively stable water levels, as they are fed by groundwater and have a constant supply of water. The ponds perched on clay fluctuate to a greater extent. The difference in hydrological regimes adds to the site's diversity and provides habitat for a greater range of species. Water voles prefer ponds with stable water levels, whereas fluctuating water levels favour many rare aquatic invertebrate and plant species.

Figure 7. Sand islands were created for waders such as little ringed plover.

5. Spoil disposal

Topsoil was stripped from the entire wetland habitat creation area in order to reduce the levels of nutrients present in what was previously an arable field. This will help maintain good water quality in the clay-based ponds, which are fed by run off from their catchment.

The topsoil and spoil from the excavation of the pond complex was used to create other habitats and land forms. The stripped topsoil from the arable land is currently stored in bunds at the edges of the site and will be used in the restoration of the landfill site in around 10 to 15 years' time. Sand and gravel spoil was used for habitat creation; for example, bars and islands were created in ponds to provide habitat for little ringed plover and other wading birds (see Figure 7). Some of the clay spoil was used to restore a neighbouring operational landfill site, and the rest was mounded up to create an area of neutral grassland.

6. Monitoring the new ponds

Monitoring undertaken within one year since habitat creation (in 2009) has already revealed two new pondweed species for the site and three species of stonewort. This makes the new ponds of county importance for stoneworts, a threatened group of plants which generally require both clean water and bare substrates to thrive. Six Nationally Scarce species of aquatic invertebrate have colonised the pond complex within this short time, and the sand and gravel islands have also been successfully used by breeding little ringed plover.

Monitoring for great crested newt in spring 2010 revealed regular counts of 30 great crested newts from the newly created ponds.

7. Conclusions: variety is key... and clean water!

Lots of habitat variation has been created within just one pond complex! The variety of pond habitat types present within one pond complex provides habitat for a range of different animals and plants.

With a variety of pond sizes, depths, shapes and substrates, a clean water source and no planting up, it can be expected that the ponds created here will continue in their development towards ponds of high wildlife value.

For further information about the Million Ponds Project and to consult other Case Studies and Factsheets from the Aggregates Toolkit, please visit *www.pondconservation.org.uk/millionponds* or email *info@pondconservation.org.uk*

This case study has been prepared in consultation with Jim Fairclough (Technical Development Director for Ecology, Golder) and Duncan Wright (Site Manager, Biffa).

Golder Associates
Biffa
Pond Conservation
For Life in Fresh Waters
NATURAL ENGLAND
Supported through Defra's Aggregates Levy Sustainability Fund