

Hampstead Heath: Viaduct Pond Management Plan

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Photo by Ian Shepherd.

1.0. SITE DESCRIPTION

1.1. Location. See map 1 on p2.

The viaduct pond is located in the area of the Heath known as The Vale of Health. It forms part of the tributary that feeds into the Hampstead chain of ponds. It is well shaded at the marginal areas and sits within a sheltered aspect. The ponds total surface area is 0.32 hectares.

1.2. Geology, Soils, Hydrology.

The soil structure around the Viaduct Pond is mostly made up of two types of clay. Claygate Beds are found in just over half of the northern side of the pond, while the remaining southern half consists of London clay.

The pond north of the Viaduct itself is steep at the sides, but almost flat at the very back where it receives the majority of its water. To the south the banks start to flatten and eventually at the most southern edge level out completely.

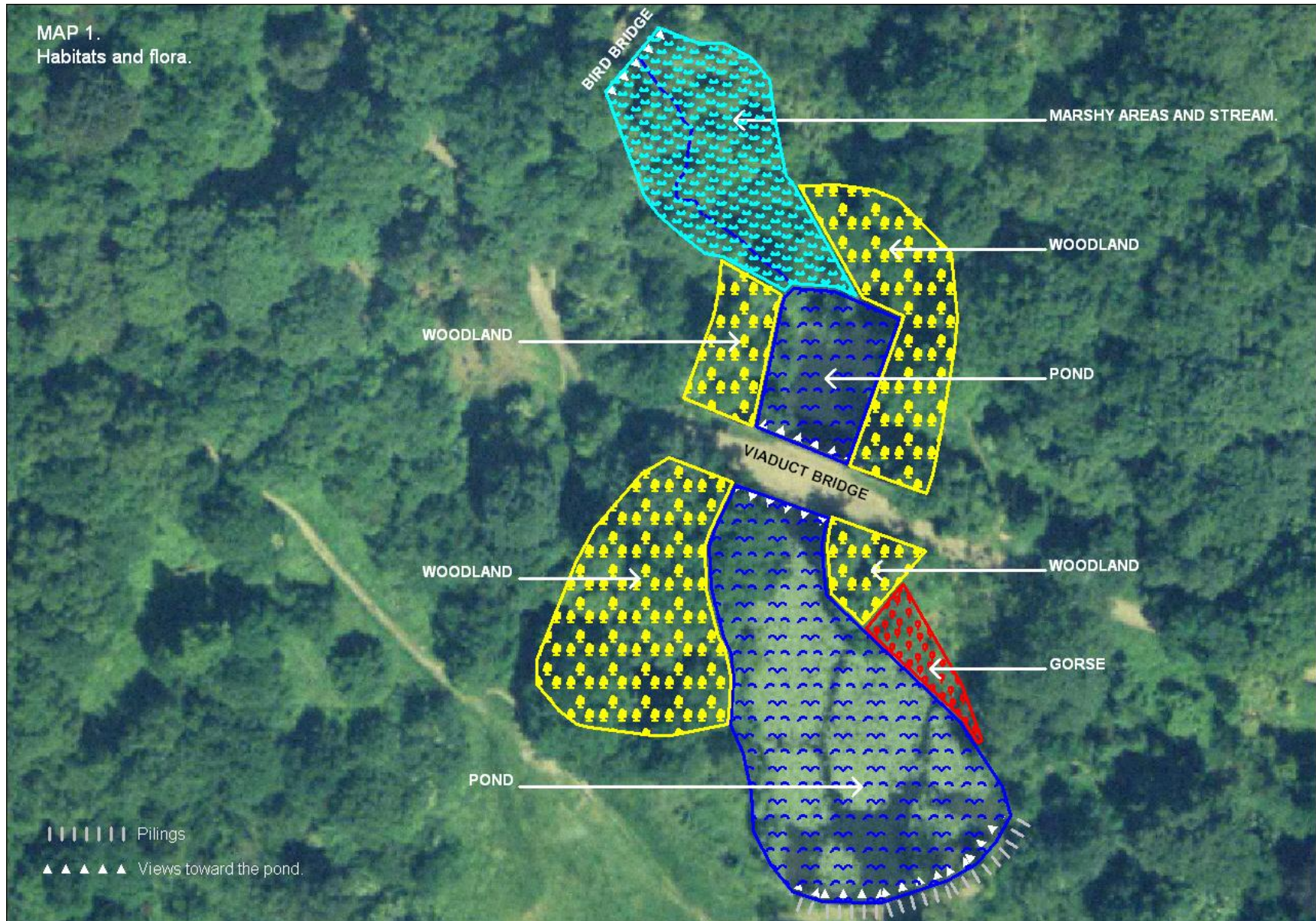
The pond suffers from a high level eutrophication. See figure 1.

Nutrient water quality data for each pond which was studied using Environment Agency data (1998-2005) and those published by EAC Limited (2004).

Pond name	Highest recorded concentration of total phosphorus			Highest recorded Concentration of chlorophyll			Poorest Secchi Disk record		Eutrophic status	Total rank score
	mg/l	No of data	Rank	mg/l	No of data	Rank	depth m	Rank		
Catchpit	0.171	1	11	0.318	1	1	N/A		Hypereutrophic	12
Mixed Bathing pond	0.196	1	10	0.115	183	4	0.48	1	Hypereutrophic	15
Viaduct Pond	0.224	1	9	0.068	1	6	0.89	12	Hypereutrophic	27
Hampstead No 1	0.537	1	1	0.005	1	17	2.68	16	Hypereutrophic	34
Thousand Pound Pond	0.021	3	17	0.051	3	8	1.5	14	Hypereutrophic	39

Fig 1.

MAP 1.
Habitats and flora.



1.3. Ecology. See Map 1.

The Viaduct Pond and its enclosure are made up of many different habitats over a relatively small area. The pond has been identified as one of the ponds on the Heath to have the highest biodiversity. This is largely because of the great amount of submerged vegetation.

Woodland makes up 0.29 hectares of the enclosure. It is a popular area for birds due to the lack of disturbance and great nesting opportunity in the thick ivy.

Gorse, a scarce habitat on Hampstead Heath, is another habitat doing well on the south facing sandy banks and has provided a secluded place for a kingfisher nesting site to be installed, though not yet used due to it being relatively new.

Marshy areas provide great feeding sites for birds due to the abundance of small insects that thrive in these locations.

Yellow water lily (*Nuphar lutea*) covers up to two thirds of the pond in the summer with a large quantity of other invasive aquatic species such as Canadian pondweed, water fern (both non-native), greater and lesser duckweeds.

A survey in 1999 by Dan Hackett identified the presence of pointed stonewort (*Nitella mucronata*) illustrated in figure 2, a species that is nationally scarce.

Nitella mucronata is described by Groves and Bullock-Webster (1920) as “singularly fugitive and seems rarely to occur in the same station in two successive years.” However the population in the Viaduct Pond was first recorded in 1999 by Dan Hackett and found by him in 2001, 2002 and in 2004. It was looked for, and found again, in 2008, when the pond was drained for restoration work. It is plausible that this colony of *Nitella mucronata* has been in the Viaduct Pond constantly since at least 1999. That it has remained there and flourished in spite of competition from macrophytes as aggressive as *Elodea* shows a rare tenacity.

Stonewort spores are durable and may remain viable for decades, allowing them to survive through adverse conditions.

Sedge and reedmace dominate the northern most part of the pond with willow and alder coppice interspersed with wavy bitter-cress, yellow iris and some foxglove.

Himalayan balsam is distributed throughout the Viaduct Pond enclosure north of the bridge.

Leading up toward the Bird Bridge the stream becomes narrow and deep for about one third of the way and contains some small colonies of wavy bitter-cress, but is mostly shaded bare soil with a thick canopy of holly and robinia and a medium sized large-leaved lime. Further up, the stream becomes more sinuous and less deep. There is ground cover of ivy and fern, and a variety of young trees and shrubs, including blackthorn, silver birch, rowan and sycamore. The upper third of the stream is wide and boggy with some bitter-cress and rush, but a large part is covered by some fallen trees covered in thick ivy that make good bird nesting habitat. The area is also heavily shaded by sycamore and tall holly.

The wooded areas surrounding the pond contain willow, alder, oak, cherry and silver birch. Ivy climbing mainly the alder trees and holly cast heavy shade over the south facing bank at the north end of the pond.



Fig 2.

The banks closer to the north side of the bridge have some privet and laurel with ivy making most of the ground cover with just a little bramble.

Some fully mature specimens of sycamore are located at the base of the Viaduct on the south side. Young sycamore saplings have colonized the enclosure.

To the south-east of the bridge there is an area mostly planted with gorse. There is a large old hawthorn and some small birch saplings. Marginals such as iris and purple loosestrife are predominantly found here also.

The Viaduct Pond has been identified as a pond with a high diversity of invertebrate species such as common darter, emperor, southern hawker and brown hawker dragonflies.

Southern hawkers have been seen laying their eggs below the water line on the pilings when the water was low in the pond. Damselflies include large red, red-eyed, small red-eyed, Azure, common blue and blue-tailed.

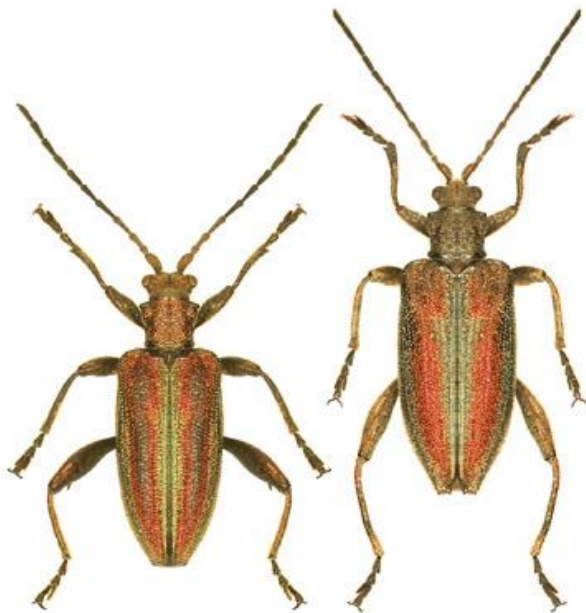


Fig 3. Not to scale.

The Dan Hackett survey identified the presence of reed beetle (see figure 3). Due to its low tolerance of eutropic water a survey should be carried out to confirm whether this rare species still occurs here.

Reed beetles (*Donacia aquatica*) inhabit aquatic vegetation such as sedge in small numbers at the margins of open water. Adults are most active during May and June.

The larvae are aquatic and feed below the surface on the rhizome of emergent vegetation.

The pond is considered to have a high frog population, but low toad population.

In recent years, an overwintering water rail has been seen amongst the rush. Kingfishers have also been spotted fishing here.

1.4. Public and educational uses.

There is no public access to the pond except on the southern edge where it is possible to fish. The Viaduct is used by vehicles and pedestrians and affords attractive views on either side.

The pond is only occasionally used for fishing, but is mostly enjoyed by the public for the view across the pond (and the many lilies) of the viaduct. This view may be one of the most widely photographed images on the heath.

1.5. History.

The Viaduct Pond was originally excavated for its clay in the 18th and 19th century for the production of bricks. Eventually these pits were dammed off to create ponds and reservoirs. The viaduct crossing was created in 1847 by Sir Thomas Maryon Wilson as part of his plan to build more housing along the road that led from the Spaniards road to the Hampstead railway station. The Bird Bridge at the most northern point of the pond enclosure was built as a folly to promote the land as an attractive place to develop.

Due to a water leak, the Viaduct Pond has been between 150-200mm lower than its maximum capacity. Because of this, the pond was drained by approximately 1m in the late summer/early autumn 2008 for repair around the outflow and has since returned to its maximum level.

Following the collapse of a large oak limb that struck the Viaduct Bridge, some crown reduction has taken place to the tree located at the south facing side of the bridge.

Gorse planting has taken place sporadically since 1983 along the eastern bank of the pond (south of the viaduct) and is now well established. Tree saplings are removed every two years.

Willow and alder were coppiced in December 2008 along the western bank. North of the viaduct at the pond inflow, willow was coppiced amongst the reedmace in winter 2007.

An attempt to remove Azolla in this area took place in July and August 2009, but was unsuccessful due to the rapid growth of the plant and the difficulty of removing every Azolla leaf necessary to complete its eradication.

1.6. External influences.

The pond had been leaking quite badly through cracks in the brickwork around the outlet from 2006 to early October 2008 and the water level was lowered dramatically to facilitate repairs. It took 5-6 weeks for the pond to rise to pre-2006 levels.

The Viaduct Pond is very nutrient-enriched, often has low oxygen, with forests of Elodea (Canadian pondweed) and water lilies and has had invasions of duckweed and Azolla.

Red-eared terrapins have been dumped in the pond (estimates at about 3) and may predate young birds and other fauna. They may also adversely affect water quality. In 2007, the Conservation Team placed one trap in the pond and 3 were caught. No sightings of terrapins have been seen since.

2.0. Evaluation

2.1. Natural landscape.

Despite stonewort's low tolerance of eutropic water, this scarce plant still remains in the Pond ten years after it was first identified by Dan Hackett.

Usually eutropic water assists the growth of epiphytic algae which form a layer on the stonewort. This inhibits the nutrient exchange between the plants cell walls and the surrounding water. The epiphytic algae also make the water turbid, preventing sufficient sunlight reaching the plant.

Water lily provides a popular refuge from small fish for *Daphnia*, a small crustacean that feeds mainly on algae. In favourable conditions and relatively small numbers, say a few tens per litre of water, they can filter an entire lake once a day. Due to the large cover of surface plants, the formation of epiphytic algae may have been greatly reduced.

The occasional disturbance of the lily by boats, dogs, fishing and the skimming off of Azolla and duckweed could provide just enough light for the stonewort to survive.

Though common throughout Europe, permanent colonies of reed beetle are established in Surrey, Cumbria and the Scottish Highlands only.

If the reed beetle still occurs in the Viaduct Pond then more emergent vegetation could help expand its range.

Adrian Brooker's 2008 amphibian report summarises the possibility for enhancements for amphibians and states that:

Although the Viaduct Pond has a large amount of submerged and floating aquatic vegetation, it only has a small area of emergent plants, which are the preferred spawning grounds for amphibians. Also areas along the south and south west banks are reinforced with steep corrugated sheets and are used for fishing and dog swimming. Further shading along the west bank makes much of it unsuitable as is the heavily shaded northern section of the pond. The most potential for enhancement through planting of emergent

vegetation exists along the west and east banks, with further planting of emergent vegetation.

According to a report by Alan Reynolds, the Viaduct Pond has the greatest potential as a dragonfly habitat of all the ponds surveyed so far. This is due mostly to large amounts of floating and submerged plant species. Where the pond falls short is in the generally small populations of emergent and marginal plants. By planting emergent vegetation such as purple loosestrife, yellow iris, sedges and water mint in the pond on the southern edge, not only would we improve the aesthetic of the pond, but habitat could also be provided for dragonflies and other invertebrates. The possibility of doing this, using gabions (wire mesh baskets filled with stones) should be investigated. This would also provide gaps between the plants and the ballast for small fish and invertebrates.

Water rail is a shy bird that is not seen elsewhere on the Heath and prefers the wet reed area at the northern most part of the pond. There is a danger of this area drying up with the large amount of silt deposited here from the stream. Slowing the stream flow that occurs here during inclement weather could slow down the erosion process considerably.

By opening up some of the water course leading to the Bird Bridge more light could be let in and allow the enhancement of the marshy areas with some small dams to slow the flow of water and reduce sediment build-up in the pond.

2.2. Public and educational uses.

The Viaduct Pond is one of the most popular ponds for people to visit and enjoy its natural and architectural beauty. It is one of six ponds on the Heath designated as fishing ponds. However, due to very low oxygen, a large number of fish deaths occurred in July 2006 and the pond is seldom used for fishing now. Water lily covers a large proportion of the water surface making it difficult for fishermen to cast without getting hooks snagged.

2.3. History and built environment.

Glimpses of the Bird Bridge could once be seen from the Viaduct as seen in figure 4. These historic view points tell a small part of the Hampstead Heath story, of how it was saved and how it was intended for development. The Bird Bridge has since become hidden from view by encroaching woodland and its interesting architecture is all but impossible to see clearly.



Fig 4.

2.4. Overall vision.

To maintain and improve:

- The variety and quality of habitats for biodiversity.
- The water quality of the pond.
- The views of the Viaduct.
- To restore part of the historic view from the Viaduct to the Bird Bridge and vice versa.
- The attractive and dramatic landscape, with its views from the Viaduct and over the water.

2.5. Relevance to achieving the 2007-2017 Hampstead Heath management plan.

Code	Action
H6	To maintain existing views and consider the restoration of lost views where appropriate.
NL2	To maintain a detailed vegetation survey.
NL5	To manage the Heath's ponds to enhance their nature conservation value.
NL8	To manage the Heath to protect and enhance populations of plants and animals protected by law, identified as being Priority Species in national and local Biodiversity Action Plans, or identified in subsequent management planning as being worthy of protection.
NL22	To eradicate or control certain invasive and inappropriate species.
HY1	To manage the Heath's ponds and watercourses to enhance their nature conservation value, reduce flood risk and address water quality problems.
HY2	To manage the Heath's watercourses to slow the flow of water, creating pools and wet flushes to slow the speed at which water and sediment enter the ponds and to manage the surface of the Heath to increase water absorption.
HY7	To improve water quality through a range of small-scale management projects.

3.0. Prescription and work program

3.1. Regular management tasks. See map 2.

Objective	Prescription	Frequency	Month(s)	Years	Who by	Priority
Monitor presence of reed beetle.	Survey around sedge and water lily.	Twice a year	May and June	2010 onwards	P.H.F. con-unit/Ecologist	High
Monitor presence of stonewort.	Survey around Canadian pondweed. See map 2.	Once a year	October	2009 onwards	P.H.F. con-unit/Ecologist	High
Reduce the competition to stonewort if quantity reduced by 50%.	Remove 25% of Canadian pondweed.		October		P.H.F. con-unit	Medium - high
Manage sycamore to reduce shade.	Sycamore saplings (inside the enclosure) removed where possible. Sycamore removed outside the enclosure north west of viaduct.	Every 5 years	October-February	2009 onwards	P.H.F. con-unit	Medium
Control invasive species.	Remove Himalayan balsam.	Every year	June till September	2010 onwards	P.H.F. con-unit	Medium
Maintain coppice to reduce build up of litter deposited into pond.	20% (approx 55m of pond edge) of alder, willow coppiced every year where they occur within 5m of pond edge.	Every year	October-February	2010 onwards	P.H.F. con-unit	Medium
Maintain heathland habitat.	Maintain patch of gorse by removing any competition such as bramble and tree saplings.	Bi-annually	October-February	2010 onwards	P.H.F. Con-unit	Medium

3.2. One-off tasks

Objective	Prescription	Month(s)	Years	Who by	Priority	Est. Cost
Improve and enhance marshy area.	Tree cover should be reduced in the area immediately below the Bird Bridge to enhance the already wide marshy area. Some of the timber removed should be used for damming and retaining more water in situ.	October	2009	P.H.F. con-unit	Medium	N/A
Control non-native species.	Remove laurel and privet.	October-February	2010	P.H.F. con-unit	Medium	N/A
Reduce erosion of soil and risk of damage to viaduct by large trees.	Coppice of large sycamore close to the water at southern side of bridge and maintained as coppice.	February	2010	P.H.F. con-unit	High	N/A
Increase marginal and emergent vegetation to improve habitat for dragonflies and reed beetle. Improve view of pond.	If the trial at the Leg of Mutton Pond proves successful then gabions should be located around the outlet (4-6m either side) and sporadically along the west bank (4-5m). They then should be planted with coir pallets containing yellow iris, pendulous sedge and purple loosestrife.	May	2010	P.H.F. con-unit	Low	£736
Restore the view between the Bird Bridge and the Viaduct.	Removal of robinia and sycamore leading up from the back of the pond toward the Bird Bridge. Coppicing of holly to reveal a view of the Bird Bridge. Coppice of birch, rowan and blackthorn if view remains obscured.	October	2009	P.H.F. con-unit	Medium	N/A

MAP 2.
Management objectives and prescriptions.

