MILLENIUM POND SUMMARY REPORT

Scope:

Undertake site investigations in the form of sediment sampling, topographical survey and desktop utilities survey. Produce report outlining:

- Constraints
- Possible causes for water loss
- Options & Budget
- Risk / Opportunities
- Recommendations

SEDIMENT SAMPLING

The sediment sampling indicates that the material in the Millennium Pond is considered non-hazardous and carries the EWC code for 17 05 06. Bankside disposal or disposal to non-hazardous landfill is an option.

UTILITIES SURVEY

The desktop service search undertaken revealed that there are services present locally within the road and pathway. However, no services were identified in the pond or its margins

TOPOGRAPHIC SURVEY

The topographic survey identified the top of bank, hard bed, soft bed and features around the pond. At the time of surveying the deepest part of the pond was 0.82m. Typically there was a 100 - 250mm depth of silt / sediment within the pond.

SITE CONSTRAINTS

- **Habitat:** The site is not subject to any statutory designation, but the woodland is a priority habitat for deciduous trees. The pond has waterfowl, fish and marginal vegetation.
- **Sediment quality:** The sediment in the pond is non-hazardous and can be disposed of in a bankside or a non-hazardous landfill.
- **Dealing with water:** The pond may need to be fully or partially drained depending on the option chosen, but there is no nearby surface water sewer to pump the water to. A temporary sump or soakaway may be needed, but the ground permeability and groundwater levels are uncertain.

CONTINUED

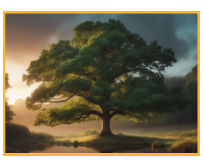
- **Public:** The site is in a public open space with many paths and attractions. The pond area may need to be fenced off during the works to ensure safety.
- **Services:** No services were identified in the pond or its margins, but there are services present in the road and pathway nearby.
- **Heritage and archaeology:** No heritage or archaeological features have been identified in the vicinity of the pond.

POSSIBLE CAUSES OF LOSS OF WATER

LOSS TO AIR

During summer months in southern England large open water surfaces can lose at least 100mm a month in evaporation. As the Millennium Green Pond is relatively sheltered it may not lose quite that depth but is still likely to lose a significant depth if there is no rainfall.

The transpiration from any plants growing in the pond will remove water, and while a dense growth of reeds may reduce open-water evaporation, it will create a significant amount of evapotranspiration (*The process of transferring moisture from the earth to the atmosphere by evaporation of water and transpiration from plants*)



LOSS TO GROUND

The reeds in the pond were removed in 2018, and the material that was taken out was placed in the wooded area. Our investigations of these deposited dredging's show that they actually comprise soft clay.
Probing around the edge of the pond also indicated that the bed was gravel rather than clay.

Therefore, the pond could be in connectivity with the groundwater, and in periods of no inflow would drop to the groundwater level – and in summer the groundwater level would gradually fall as the water is taken up by the numerous adjacent trees.

FURTHER CHECKS

In order to understand the reason for the loss of pond water further, a gauge board should be installed in the pond, at a point where even very lowest water levels can be read. In addition, an observation borehole or trial pit should installed about 20m from the edge of the pond.

Water levels in both the pond and the observation borehole should be read at least weekly, and the records examined to determine if there is a correlation between both, especially after the pond level drops to a stable level.

PRE COMMENCEMENT ACTIVITIES

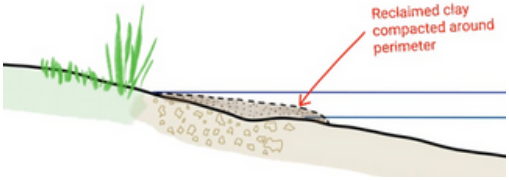
- **Ecology survey:** An ecology survey should be undertaken to check for any protected species or habitats in the pond before any works are carried out.
- **Vegetation clearance:** Any vegetation in the areas to be relined or reprofiled should be removed, and some tree works may be necessary for machine access.
- **Silt survey:** Undertake new sediment samples (typically no longer 12 months before work)
- **Fish movement/rescue:** If the pond is to be fully or partially drained, the fish should be removed and relocated. apply for FR2 from the Environment Agency to use fishing instruments other than a rod and line (i.e. nets).
- **Enabling works:** A site compound, ground protection and secure fencing would be required for the main works.

OPTION 1

Partial relining

This option involves using volunteers to return the dredged clay to the margins of the pond and cover it with topsoil.

- **Advantages:** This option is very low-cost and does not require any machinery or permits.
- **Disadvantages:** This option may not solve the problem of water loss if the clay below the water level has also been removed or if the groundwater level is lower than the desired water level.
- **Budget:** £8700 (for borehole). Main works costs nil.



OPTION 2

Total relining

This option involves draining the pond temporarily and relining it with clay or a butyl liner.

- **Advantages:** This option would provide a watertight membrane to the pond so that water cannot escape by infiltration.
- **Disadvantages:** This option is costly and would require a fish rescue and a method of draining the pond. It would also not prevent water loss by evaporation and transpiration. As well as the pond being reliant on water inflows to top up the levels.
- **Budget:** £8700 (for borehole). Main works costs £70,000 - £80,000 with an additional £2000 for post completion works.

OPTION 3

Pond Reprofiling

This option involves excavating a deeper area for the fish when the water level drops, reducing the risk of predation.

- **Advantages:** Less costly than option 2 and would provide a deeper and safer pond for the fish. It would also allow for bank reprofiling to reshape the edges of the pond if required.
- **Disadvantages:** This option would only work if the liner below the stabilised water level has lost its integrity and is in continuity with the groundwater. It would also not maintain a constant water level in the pond, which would still fluctuate with groundwater levels.
- Budget: £8700 (for borehole). Main works costs £45,000 - £55,000 with an additional £2000 for post completion works.

OPPORTUNITIES

- Option 2 and 3 assumes dredged / excavated material is taken off site which is costly. Opportunity to engage with TPO officer to clear area of vegetation to enable onsite material storage (subject to analysis)
- Engage with local county / council ecologist to seek advice regarding pond, specifically suitability for Great Crested Newts.
- The installation of the borehole would aid in determining the repair option but may also provide a source of water for replenishing the levels within the pond.

CONCLUSION / RECCOMENDATION

Before being able to make an informed choice of option, it is recommended that the borehole and monitoring of water levels takes place. In doing so will provide more confidence with regards to chosen solution.