

AquaticEngineering

Working Above Water, On Water & Under Water

Case Study : Farmoor Reservoir – Living Filter



Client: Thames Water

Contractor: AquaticEngineering

Duration: 6yrs

Engineering Peer Reviewed: MWH

R&D Project

AquaticEngineering has been working in partnership with Thames Water for a number of years to bring the 'Living Filter' project to reality. It was finally installed during the summer of 2012 and a PhD student was selected in October who is being supervised by the University of Oxford (Dept. Engineering Science) and Thames Water for 3yrs.



Due to the complicated profiles under water, around the offtake pumping station on Farmoor 11 Reservoir, the AquaticEngineering dive team were deployed in depths of 13m to undertake a full bed survey and identify submerged anomalies which could interfere with this reasonably large installation having a footprint of over 1000m².



The divers removed accumulated debris including lost anchors, chains, ropes, an outboard engine and concrete slabs. They then drilled anchor bolts into the concrete bed to attach the many tonnes of steel dead weights required to hold the system in place, the anchor bolts were required to hold the steel weights in place and prevent them sliding due to the steepness of the profiles and the accumulated biofilm which covered the reservoirs concrete apron around the pumping station. The substantial anchors are required to hold the many components in place which total over 10 tonnes in accumulated weight. All components had to be DWI compliant due to the size and surface area of each material used in fabrication.





Although each component was fabricated either in the AquaticEngineering factory on the Isle of Wight or adjacent to the reservoir, assembly on water of the many components took several weeks to complete.



Almost 2000m² of baffles and curtains, along with almost 10,000m² of accretion materials for biological attachment were fabricated and installed within and below the 210m² floating system.



Once the engineering side of the installation was complete, the 'living' component was added in the form of 210m² of pre-grown coir pallets of several aquatic species selected for specific purposes. It is vital to use established coir products in any project, however this is especially the case in exposed environments – ideally the product should be established for at least 6 months during the growing season to produce the essential root biomass and associated rhizomes.





Within weeks of installation algae became entrapped within the system as designed, although a little too early to determine the effectiveness of the system it will be monitored continuously for the next 3 yrs – one of the many sampling points amid the algae 'soup' can be seen below.





Year 1 establishment of the Living Filter - Floating Island System



Year 2, the floating Island improves with age to become a truly self-perpetuating living ecosystem. Planting in this instance was evaluated for filtration purposes, however a wide range of species can flourish in this environment to create an extremely biodiverse & aesthetically pleasing habitat.

Floating Island Systems are extremely stable and can support many tonnes if so required, the island can be submerged from between 0.5m and 2m deep creating a complex submerged ecosystem colonised by a wide range of aquatic life beneficial to water quality & biodiversity.



Tubes being installed in the Living Filter to facilitate the use of endoscopes and the sampling of water, root growth & submerged internal matrix colonisation.



Walkways were retro fitted to enable ease of access & sampling to be undertaken



PhD Student of Engineering Science & Thames Water Staff continually monitor results.



Water temperature and dissolved oxygen levels being measured even in winter



The Living Filter designer & fabricator - plant and internal matrix samples being removed to determine plant health, root biomass (to 1.6m depth) and root colonisation of beneficial microbes – laboratory DNA finger printing is undertaken for accurate species identification.



The internal matrix used within the Living Filter and Floating Islands is rapidly colonised by microbial biofilm and in this instance bivalves. Plant roots penetrate into the matrix further adding to the 'attachment' surface area – silts and suspended solids become entrapped within this intricate web providing a carbon source for the huge resident zooplankton populations.

Floating Islands and Living Filters have an indefinite life expectancy and improve/mature with age, their internal buoyancy cannot be compromised and are therefore safe and unsinkable – depending on the intended purpose and use, our floating systems can be designed to support shrub and tree growth, secluded nesting areas, a wide range of biodiverse aquatic and terrestrial planting or many other features.

Integral wildfowl predation is easily installed to provide either side protection or full canopy protection.

Whatever your requirement, call us first and we will be pleased to assist you

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