



Management of Water Quality Issues in Urban Stormwater Ponds

Ryan Xu¹, Ricky Kwan¹

¹Storm Consulting, Greenwich, Australia

Overview

Algae bloom and excessive pondweed growth was a problem in two connected ponds in the Fairwater Residential development at Blacktown. The coverage of these aquatic plants extended over most of the surface areas of the ponds during the summer period. Storm Consulting (Storm) was engaged to provide a stormwater management strategy to mitigate the water quality problems at the site.

Short and medium-term management measures developed for the ponds included the following:

- Mechanical harvesting and removal of the algae and pondweed; and
- Application of algaecide/ phoslock/ flocculant

The above measures were implemented and found to be effective in removing up to 95% of the algae and pondweed. However, as these measures were intended to be temporary only, additional longer terms measures were identified.

Potential longer-term measures identified for the ponds included the creation of bioretention systems along the edges of the pond, use of an organic bioretention filter system, floating wetlands, extended aeration and recirculation, water level management and the use of barley straws. MUSIC modelling was used to assist in evaluating the effectiveness of the various options in managing the pollutant loads and concentrations.

Comparison of the options indicated that while a number of these options would be suitable and effective over the longer-term, the cost of retrofitting the ponds would generally be prohibitive. On this basis, a maintenance and monitoring regime, coupled with regular harvesting of the weeds and chemical treatment of the algae whenever required, was adopted as the most cost-effective way forward.

Objective

The main objective of the project was to provide a stormwater management strategy to mitigate existing algal bloom and excessive weed growth in the ponds. Secondary objectives included cost considerations, and ease of construction and maintenance.

Methods

The methods used in this study consisted of practical field experience coupled with water quality modelling using MUSIC software. This included identifying the type of algae and pondweed and selecting the appropriate treatment.

MUSIC modelling was used to assist in understanding the pollutant loads and concentrations in the ponds and in testing the effectiveness of the various treatment options.

Detailed costings for the various options were undertaken to provide an indication of the cost effectiveness of the proposals.

Results

The results indicated that a floating wetland system or use of a high performing organic media bio-retention system were likely to be the most effective measures for the ponds for longer term water quality management. However, these measures were found to be relatively expensive for this site, due to the reconstruction works required, and were not adopted.

The adopted strategy consisted on the following:

- Regular maintenance of the gross pollutant traps in the catchment
- Removal of sediment deposited at stormwater network outlets or inlets to the ponds
- Regular water quality monitoring of both ponds
- Extended periods of operation of existing aerators and recirculating system during the warmer months
- Mechanical harvesting and chemical treatment when required.

Conclusions

Short term, intermediate and longer-term management measures were identified and assessed for water quality treatment of two connected ponds in Blacktown.

It was found that mechanical harvesting and chemical treatment were effective in removing the bulk of the algae and pondweed from the ponds over the short to medium term.

A floating wetland system and high-performance media bioretention system were found to be effective for longer term management of the water quality.

However, due to cost constraints, it was recommended that a maintenance and monitoring regime, supplemented with mechanical harvesting and chemical treatment of the algae when necessary, be adopted.