Chapter 10 **Ponds and Lakes**

10.1 Introduction

Ponds and lakes are artificial bodies of open water usually formed by a simple dam wall with a **weir** outlet structure or created by excavating below natural surface levels. The depth of water in these waterbodies is typically greater than 1.5 m and there is usually a small range of water level fluctuation although newer systems may have riser style outlets allowing for **extended detention** and longer temporary storage of inflows. Aquatic vegetation has an important function for water quality management in ponds and lakes. Emergent **macrophytes** are normally restricted to the margins because of water depth, although submerged plants may occur in the open water zone. Submerged plants are important to the maintenance of both biological processes and water quality. They provide a surface for the absorption of dissolved nutrients and provide food and shelter for zooplankton which may graze on algal species. The oxygen released during photosynthesis is important in maintaining oxygen saturation in the water column which is depleted by animal respiration and decomposing organic matter. Vegetation can also help stabilise sediments and reduce the release of sediment-bound nutrients arising from resuspension processes. Ponds are seldom used as 'stand-alone' stormwater treatment measures and are often combined with **constructed wetlands** as a treatment forebay to the open waterbody. In many cases, these ponds ultimately become the ornamental waterbody that require water quality protection.

Ponds and lakes often form part of a flood-retarding system and design requirements are generally associated with hydraulic structures for flow conveyance and flood attenuation. These are not covered in this document and only design elements associated with the water quality function of the system is presented.

There have been cases where water quality problems in ornamental ponds and lakes have been caused by poor inflow water quality, especially high organic load, infrequent waterbody 'turnover' and inadequate mixing. Detailed modelling may be necessary to track the fate of nutrients and consequential algal growth in the waterbody during periods of low inflow (and thus long detention period). As a general rule, it is recommended that the turnover period for