Canal with jetties

In the planning and preliminary design, provision was made to fill the canals as a once-off with water from Hartebeespoort Dam. It is common knowledge that this water is rich in phosphorus and nitrogen (eutrofied), containing levels of these above the growth limiting level for use by photosynthetic organisms. The total surface area of the canals is in excess of 11 hectares and the operating water depth is 1.5m.

The water storage volume in the canals is approximately 170 million litres. Water loss due to evaporation is made up by water from boreholes and settled storm water. There are two zones or areas where water quality for recreational purposes plays an important role at The Islands. One is the water in the canals and the other is the entrance section from the dam. Both of these have been dealt with through re-circulation. The aim of improving and maintaining a good quality of water in the canals was based on two processes, namely filtration and reducing the phosphorus and nitrogen levels in order to starve the growth of photosynthetic organisms and aquatic plants in the canals. The solution of an artificial wetland was selected because of the great contribution to the environment it can provide. The media in the wetland is porous, allowing horizontal flow through it and the roots of selected aquatic plants on the surface abstracting nutrients from the water. Water from the top canal is circulated through the artificial wetland at a rate of 400 litres per second. Water from the bottom canal is pumped at 780 litres per second to various outlet points in the top canals to prevent stagnation or dead spots there (in the top canals).

The water quality in the canals is further improved by being blended on a continuous basis with borehole water and settled storm water. The constructed wetland on the site consists of a shallow, lined excavation containing a bed of porous soil gravel, in which emergent aquatic vegetation has been planted. The depth of the bed in this design is 0.7m and the bed media selected is a coarse stone layer. The wetland was designed to polish or reduce nutrient levels in the water. The layout makes provision for islands, walkways and different types of aquatic plants which must be maintained on a continuous basis. The blue-green bacteria growing in Hartebeespoort Dam cannot establish itself in the canals because of the growth environment created in them. The flow of water in the canals, preventing layer forming (stratification) of the water, and the lowering of the phosphorus and nitrogen content of the water contributes to a growth-restricted environment for the blue-green bacteria. Other possible pollution contributors are fuel spillage and littering. The detail design makes provision for a fuel and oil trap with cleaning mechanism. Floating debris will be removed at designated collecting points and parts of the canals can be shut off to remove silt and settled solids. A hybrid flotation water inlet structure has been placed in the dam, from where water is gravitated to a sump in the entrance bay. It is then pumped to three waterfalls placed at the furthest point from the dam in the entrance bay. Aerated, semi-flotation water is circulated at 300l/s into the entrance bay, displacing water on a continuous basis back to the dam. The entrance width at the dam is narrowed, enabling outflowing water to flush the entrance bay continuously.