

Macleod Morass constructed wetland

Wastewater and the environment working for you

What is Macleod Morass?

Macleod Morass is a deep freshwater marsh, forming an extensive wetland on the Mitchell River flood plains near Bairnsdale. The wetland is a lowland area saturated with moisture and regarded as a natural habitat and feeding ground for birds (including migratory birds), mammals, snakes, frogs, macro-invertebrates and aquatic vegetation.

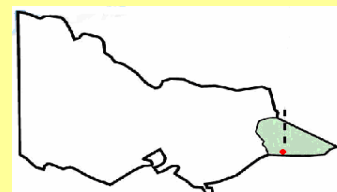
The Morass

- The Morass is internationally recognised (Ramsar convention 1971) as a site for migratory birds
- Class A conservation value (Department of Water Resources 1989)
- listed as an important wetland of Australia (DSE)
- habitat for five endangered bird species
- a State Game Reserve
- Ibis rookery
- a site for recreational activities including walking, bird watching, game / duck hunting, educational training and tourism.

Why intervene?

The Morass was a degraded wetland habitat due to:

- pollutants
 - previous treatment plant discharges
 - adjacent sale-yard wash-down water
 - adjacent municipal tip and urban stormwater including rubbish
 - loss of wet-dry cycle
 - increasing salinity
 - pests – particularly European Carp dominate native species.
- The distribution and abundance of vegetation dependent on the Morass environment was thus severely affected and caused loss of bird and animal life.



A major reason for developing the CWLs was nature's ability to remove nutrients from wastewater by using aquatic plants. Graph 1 (below) demonstrates outstanding success.

Fresh water flow from the CWLs together with the levee banks assists in excluding salt from the Morass.

Nutrient removal

Raw sewage contains relatively high levels of nitrogen and phosphorus. Treatment removes most of the phosphorus (PFS process) but little nitrogen. Effluent exiting the treatment plant and entering CWL1 is still rich in nitrogen. However, the nitrogen is taken up by plants, stored in sediment and also transformed into gaseous nitrogen. The nitrogen stored in plant material will be harvested, thus allowing nutrients to be removed from the system and preventing their entry into the Morass and ultimately the Gippsland Lakes system. (Graph below shows typical monthly monitoring results).

Conclusion

Through design, construction and operation of the CWL, East Gippsland Water, Parks Victoria, Environment Protection Authority and other stakeholders combined to ensure a positive future for the Macleod Morass ecosystem. Re-use of the recycled wastewater from BWWTP protects and enhances biodiversity in this important wetland. By providing this high quality wastewater the Authority is able to record 100% environmentally beneficial re-use from BWWTP.

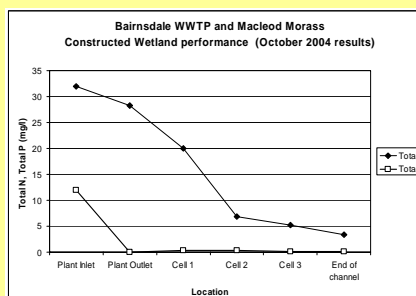
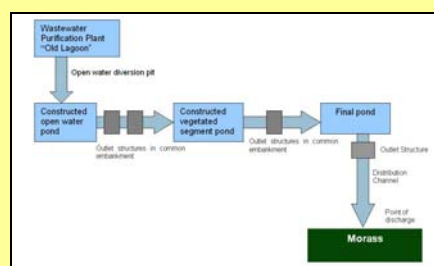


Constructed wetlands

During 2001/02 East Gippsland Water completed a major construction project involving a network of three constructed wetland cells (CWLs) and associated levee banks and structures to control water flows and levels through Macleod Morass. The works ensured protection for the ecological values of the wetland and that its value as waterbird habitat is enhanced and sustained.

Constructed Wetland Cells 1 and 2 are the engine rooms where aquatic plants use large amounts of nutrients while growing. Water flows from CWL 1 into CWL 2 and then into CWL 3 for final polishing before entering the distribution channel.

Levee banks block water in various parts of the Morass and act as pathways for pedestrians, as well as vehicle access for management purposes. Spillways are incorporated into the levee banks to accommodate flood flows. The distribution channel also provides further polishing as it carries water from the CWLs to other Morass segments. Deliberate drying of wetland segments can be used to control carp, other pest plants and animals.



Treatment Plant History

Commissioned in 1939, the Bairnsdale Wastewater Treatment Plant (BWWTP) pictured above consisted of a grit channel, sedimentation tank, cold digester, trickling filter and a small lagoon before distribution to Macleod Morass. The treatment plant continues to operate and discharge to Macleod Morass from this site.

The plant has since undergone major changes including:

- early '60s - duplication of sedimentation tank, cold digesters and humus tanks at the outlet of the trickling filter
- 1981 - heated digester, gas tank and circular clarifier installed
- 1982 - construction of retention lagoon
- 1983 - construction of second stage trickling filter, filter basin and wet weather basin
- 1990 - construction of sludge thickener for digester
- 2000 - testing and installation of phosphorous removal - addition of polyferric sulphate (PFS)
- 1998/2002 - construction of constructed wetland cells for nutrient removal.

Information provided by East Gippsland Water Treatment Plant Operator (Bairnsdale), Barry Waddell.