Tootgarook Wetland/Boneo Swamp

The location of Tootgarook Wetland/Boneo Swamp ('the swamp') on the Nepean Peninsula, VIC is shown in Figure 1. Figure 2 illustrates the local hydrogeology (including physical processes), topography and key floral species of the swamp. The landscape setting of the swamp, showing typical land uses and more regional hydrogeology is presented in Figure 3.

Ecosystem Type: Wetland classed as Shallow Freshwater Swamp.

Land use: Degrading activities have included partial draining, vegetation removal, peat, limestone and marl mining, dairy farming, and infilling for development. Infilling, pasture grazing and vegetation clearance still occurs.

Values: Cultural: Aboriginal cultural heritage artefacts and historical values remaining from marl and limestone kiln. Ecological: A biosite of state significance for its *biodiversity and natural values*. Supports numerous endangered/vulnerable Ecological Vegetation Class (EVCs) and several threatened flora and fauna and/or species listed under migratory bird agreements (JAMBA/CAMBA). Represents the largest remnant of natural freshwater marsh in the Melbourne Water region and is identified in the Healthy Waterways Strategy as a priority area for *focal values* including vegetation, birds and frogs. Social: Acts as a natural retarding basin; helping control flooding of adjacent areas and providing flood protection to Rosebud and other urban areas to the north/north-east.

Hydrology/hydrogeology: The swamp is the most significant control on surface and subsurface hydrology in the catchment. It has a 100 year storage capacity of 2.7 million cubic meters (hence its value as flood protection). The swamp is in connection with the shallow, largely unconfined Quaternary aquifer. Discontinuous clay and peat layers may provide very locally confined areas. Groundwater elevations across the swamp are mainly at or above the surface. The swamp is a groundwater discharge feature with evapotranspiration from shallow watertable and discharge to Chinamans Creek. The highly permeable landscape leads to diffuse recharge from infiltration of rainfall/stormwater runoff over large areas (including the swamp) with higher recharge rates in the surrounding dune systems. Local to regional scale groundwater flows from recharge areas in higher topographies towards the swamp.

Groundwater elevations have consistently remained above the bed level of Chinamans Creek; a permanently "gaining" (from the groundwater system) watercourse running south to north through the swamp. Drum Drum Alloc ("losing" for much of its course) flows from the west and confluences with Chinamans Creek northeast of the swamp.

Groundwater salinity in the area is relatively fresh at <1000 mg/L. Water quality in Chinamans Creek is at risk from stormwater runoff from neighbouring developments and land uses. Nitrate inputs (e.g. from fertiliser applications and septic tank recharge) are of particular concern.

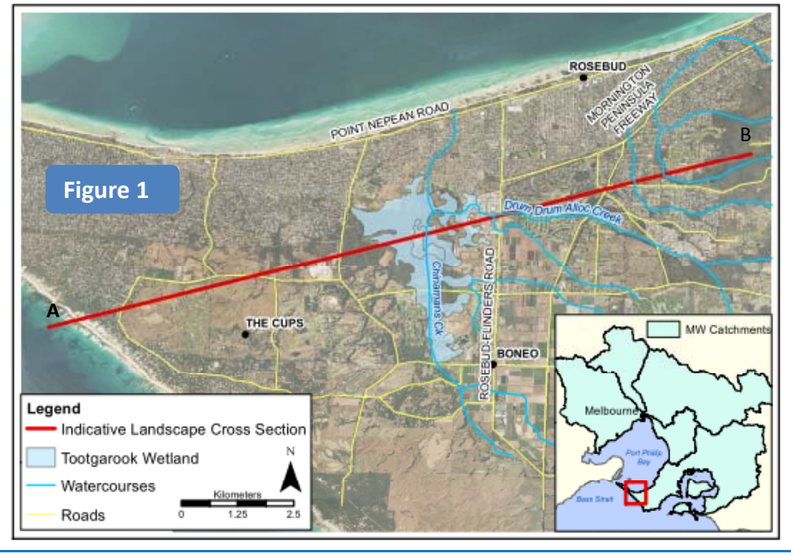
Ecosystem services: Groundwater maintains saturation of the wetland system. This provides habitat for wetland ecosystems and maintains the saturation of potential acid sulphate soils (PASS). Saturation also maintains surface water runoff, thereby preventing the area becoming a significant recharge zone. Shallow watertables also support groundwater dependent terrestrial vegetation that use groundwater to maintain evapotranspiration potential.

Threats: Extensive stock and domestic groundwater extraction in immediate vicinity of (and within) currently occurs within the swamp boundary. Lowering of the watertable from drainage/extraction/extreme climate changes could lead to acidification of soil, groundwater and subsequent receiving waters (via leaching from soil). The swamp is at risk from land use change such as urban and industrial development with around 80% of swamp in private ownership, which would result in increased urban stormwater runoff and hence changes to the groundwater/hydrological regime and water quality of the remaining swamp area. The old tip site, now a recreational reserve, in the north-west of the swamp is likely influencing groundwater quality locally through subsurface leaching. Saltwater intrusion could be an issue in the future if groundwater levels continue to fall and extraction increases causing migration of the freshwater-saltwater interface. Impact of extraction is evident in the changes to the seasonal amplitude of groundwater levels across the landscape, causing lower (deeper) seasonal watertables during high demand periods. During dry periods (droughts), increased evapotranspiration demands exacerbates the impact of groundwater extraction.

Sensitivity: The swamp is highly sensitive to changes in the groundwater regime. The consistently shallow (<1 m below ground level) watertables since monitoring records began maintain the current hydrological regime and relatively neutral/slightly alkaline soils. Swamp species are reliant on this stable environment; even slight changes in the groundwater and hence hydrological regime will likely lead to temporary or permanent loss of species. More importantly, it could cause potentially irreversible species loss/habitat damage from acidification of soils, groundwater and receiving waters.

Monitoring: Significant knowledge gaps exist around the impact of changes to the seasonal variation of groundwater levels due to pumping in dry periods. There is a need to understand and quantify links between the saturation within the wetland caused by shallow watertables, variations in seasonal drawdown and potential impacts on water quality and ecosystem health. A significant knowledge gap exists around the impact on groundwater quality of treated waste water used for irrigation in the Chinamans Creek catchment.

LOCATION



Key information sources:

Condina P, 2011. *Tootgarook Swamp, Rosebud: Literature Review and Directions Report.*.

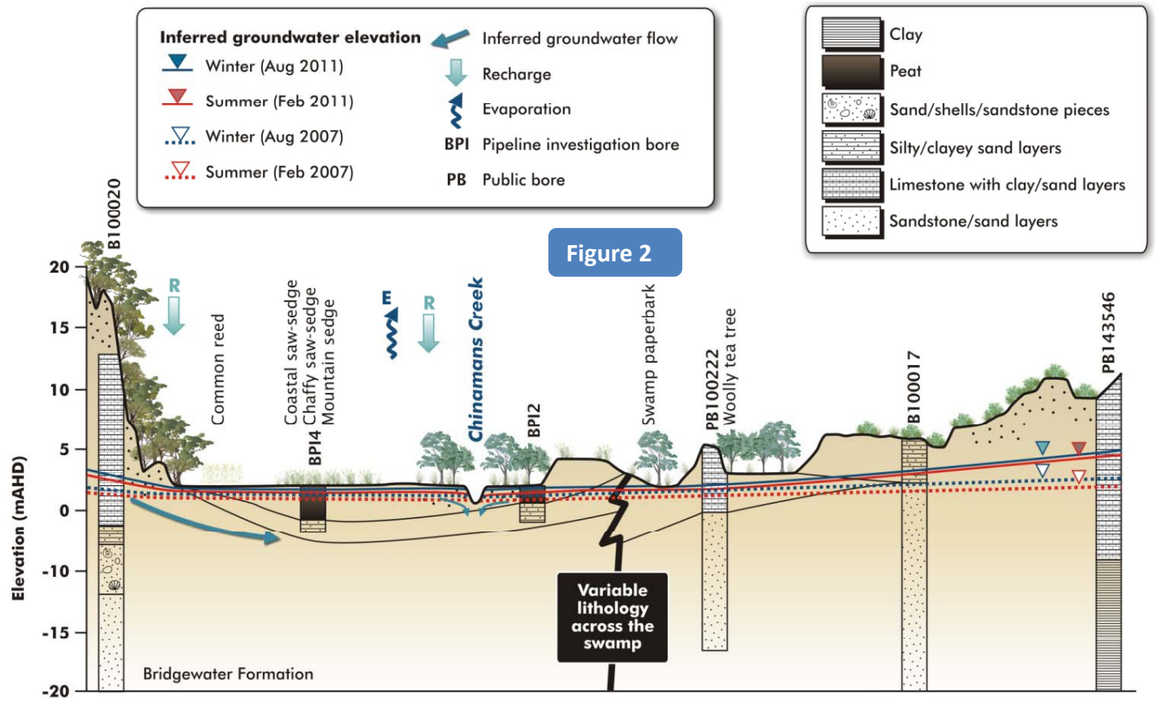
Darling DB, 1992. *Rosebud – Rye Pipeline Stage 1: Tootgarook Swamp.* Melbourne Water (M2317/AB). Coffee Partners International Pty Ltd, Melbourne.

Graham M, 2010. *Groundwater Resource Appraisal for Southeast Melbourne.* Report for Southern Rural Water. Parsons Brinckerhoff, Southbank, Victoria.

JLCS, 2007. *McNaught Wetland Hydrogeological Assessment (GW-07/006).* John Leonard Consulting Services.

SKM Melbourne Water

LOCAL ECOHYDROGEOLOGY



LANDSCAPE SETTING