MORGAN TO WELLINGTON MODEL 2010

Purpose

The purpose of the model, as described in Yan et al. (2010), is to rerun scenarios for accreditation as Salinity Register entries by the MDBA. The model provides a management tool for determining salt loads entering the River Murray between Morgan and Wellington. The model can also be used to assist with broad scale planning of groundwater management strategies in the future.

Background

The Department for Water (DFW) first developed a MODFLOW numerical groundwater flow model for the Morgan to Wellington area during the late 1990s (Barnett *et al.* 2001). Subsequent modelling work involved using updated recharge rates and included the area west of the river (Barnett & Yan, 2006).

In 2009, DFW commissioned Aquaterra to refine and update the model incorporating data from a recent hydrogeological review completed by Australian Water Environments (AWE) in 2008.

The 2009 model was simulated the actual river level below Lock 1 (-0.7 m AHD) for all scenarios.

In 2010, DWLBC rerun scenarios for accreditations as Salinity Register entries. In line with MDBA Salinity Register requirements, irrigation recharge and river level conditions that represent the average conditions (excluding recent drought impacts) have been applied within all prediction scenarios. In particular, the recent decline in River Murray water level below Lock 1 since 2000 has not been simulated in the 2010 model.

The model was built with Visual MODFLOW version 4.1.

Location

The location of the model domain is shown in Figure 1.

Model structure

Model domain and grid size

The model domain simulates an area 80 km (east to west) by 145 km (north to south). The bounding coordinates of the model domain are 340000E, 6090000N (south-west) and 420000E, 6235000N (north-east) (GDA 1994, MGA Zone 54).

The rectangular model grid is divided into 496 columns and 992 rows with a regular model cell size of 150 m × 150 m over the entire domain, resulting in total of 492 032 finite difference cells over the three model layers.
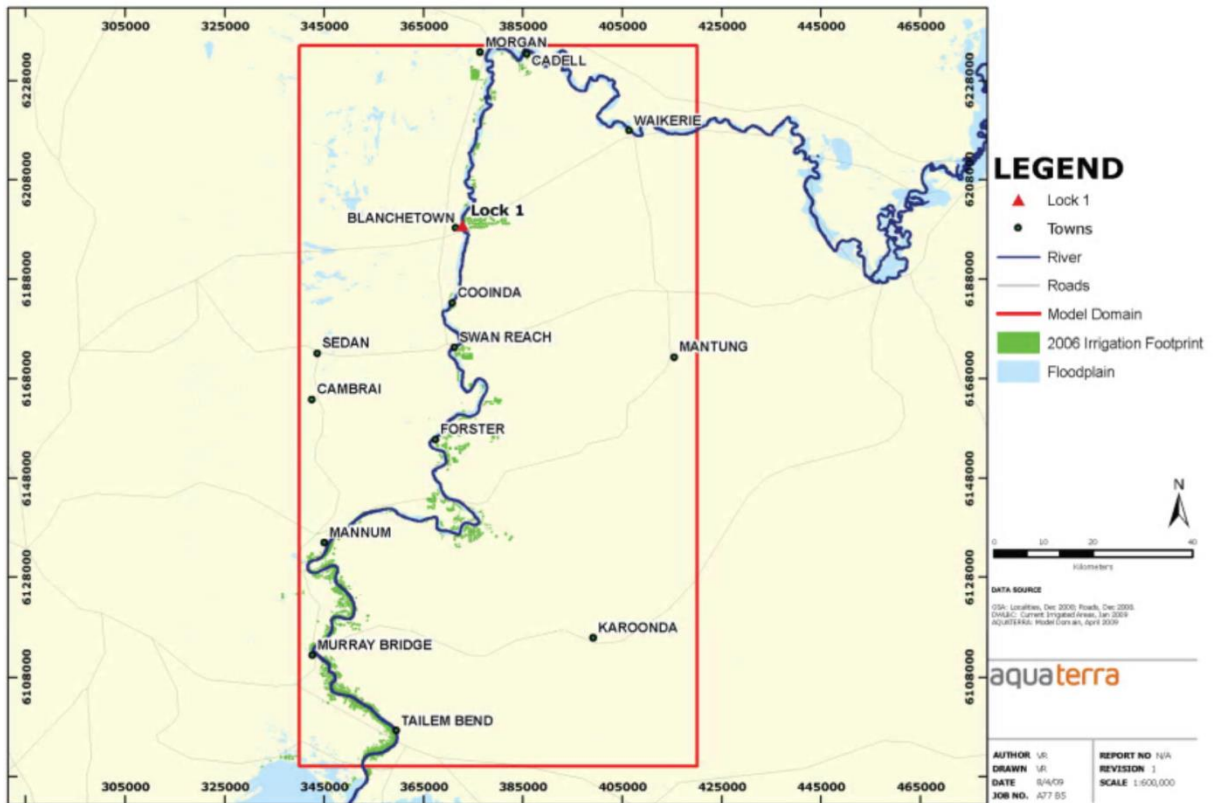
Figure 1.   **Morgan to Wellington model domain**

Model layers

The regional aquifer system in the Morgan to Wellington area is conceptualised as a three layer model, including two aquifer layers and one aquitard layer (Table 1 and Figure 2).

Table 1.   **Model layers**

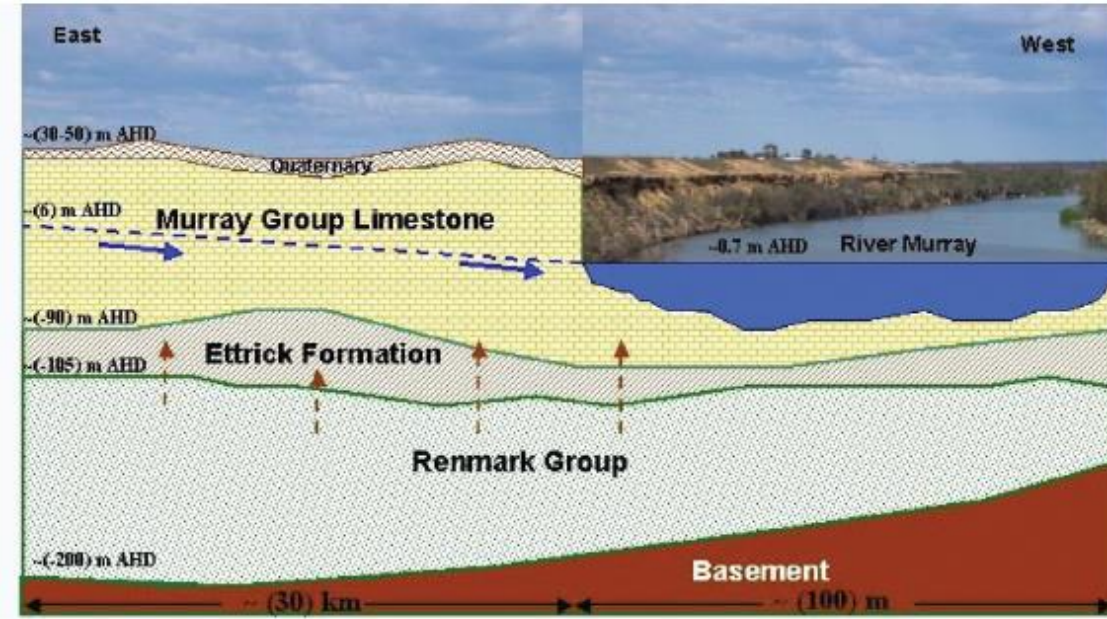| Layer	Hydrogeological unit	Aquifer/Aquitard	MODFLOW layer
1	Murray Group Limestone	Aquifer	Type-1
2	Ettrick Formation	Aquitard	Type-3
3	Renmark Group	Aquifer	Type-0

Figure 2.   **Cross-section**

Report

Yan W, Morgan L, Georgiou J, Evans S and Vears L, 2010, *Morgan to Wellington numerical groundwater model 2010 for Salinity register entry*, Report DWLBC 2010/09, Department of Water, Land and Biodiversity Conservation, Adelaide