

MORGAN TO WELLINGTON MODEL 2009

Purpose

The purpose of the model, as described in Yan et al. (2009), is to provide a management tool for determining salt loads entering the River Murray between Morgan and Wellington. The model results are used to evaluate salt loads from accountable actions (such as irrigation practice and irrigation area development) for Murray-Darling Basin Authority Salinity Register entry. 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 model is used to simulate the period between 1920 and 2109. Modelling of predictive scenarios starts from 2009. The model was used to run salt load impact on river level changes in 2009 and special scenarios for MDBA Salinity Register Entry in 2010.

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.

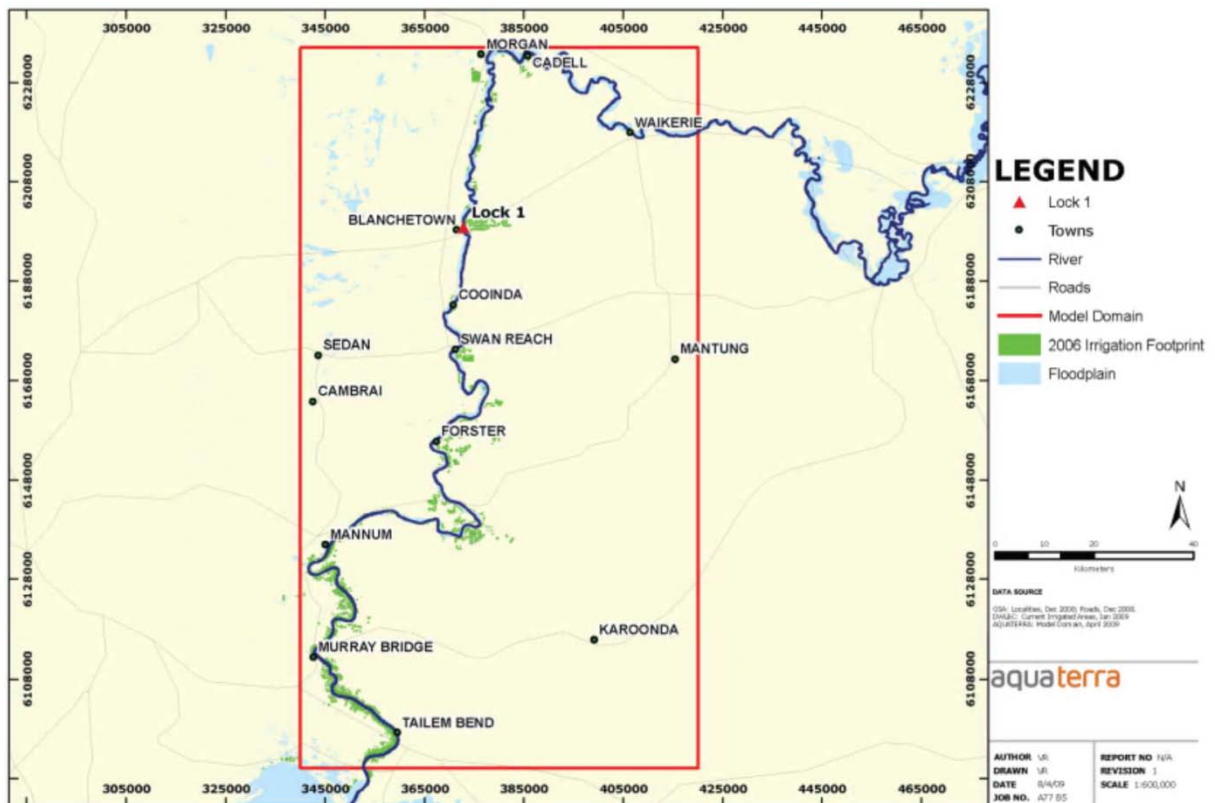


Figure 1. Morgan to Wellington model domain

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

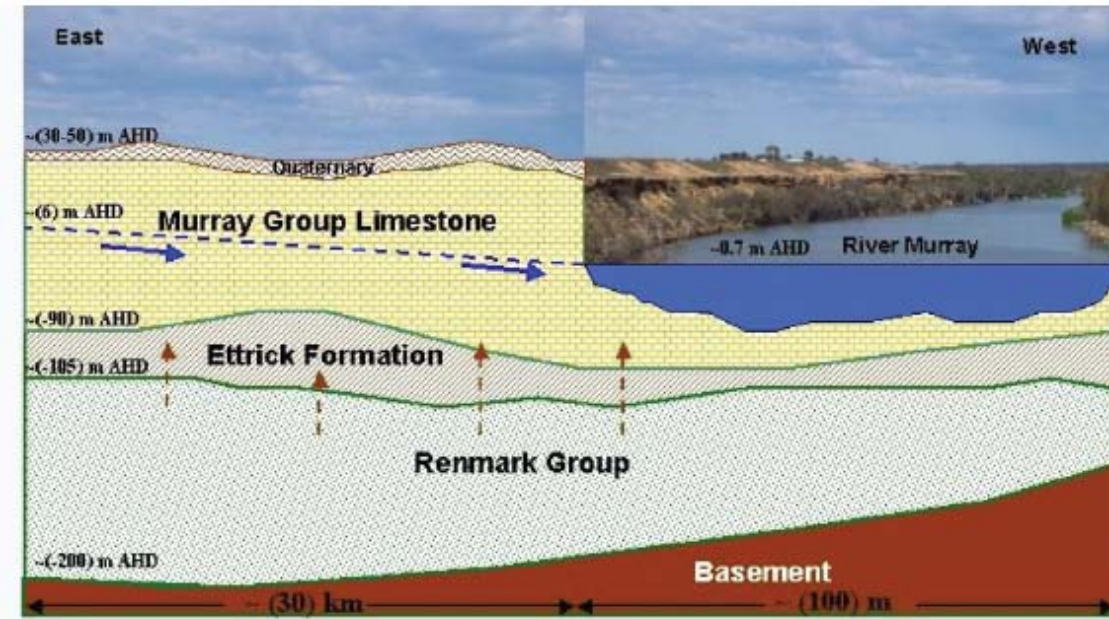


Figure 2. Cross-section

Report

Yan W, Morgan L, Georgiou J, Evans S and Vears L, 2009, Morgan to Wellington numerical groundwater model 2009, DWLBC Report 2009/22, Government of South Australia, through Department of Water, Land and Biodiversity Conservation, Adelaide.

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