WAIKERIE TO MORGAN MODEL 2012

Purpose

The aim of the model, as described in Yan, Li and Woods (2012), is to become the basis for a revision of the western part of the accredited Morgan to Lock 3 model developed by Rural Solutions in 2005 which is used to estimate salt load credits and debits for the Salinity Registers.

Background

Rural Solutions developed a numerical groundwater model that extends from Morgan to Lock 3. This model was accredited for use with the Salinity Registers and is used to attribute salt loads to the River Murray from Overland Corner to Cadell.

Commencing in 2006, Australian Water Environments (AWE) conducted five year rolling reviews of the Waikerie Salt Interception Schemes (SIS), the Woolpunda SIS and Stockyard Plain Disposal Basin. Within these scopes of work a detailed review of the Rural Solutions model was undertaken, focussing on the Waikerie and Qualco regions. The review identified a number of issues concerning the accredited model, in particular that the adopted aquifer parameters did not agree well with the available field data.

AWE concluded that the accredited model was unsuitable for estimating the effectiveness of the region's SIS. AWE presented an alternative conceptualisation, which was represented numerically in a three dimensional Waikerie Lock 2 regional groundwater model. The results of the studies suggested that upward leakage from the Lower Mannum Formations, instead of the horizontal flux from the Glenforslan Formation as in the accredited model, provides the majority of flux to the floodplain aquifer in the Waikerie Lock 2 reach of the River. Therefore the Lower Mannum Formation aquifer should be targeted for interception.

The model covers the period between 1910 and 2110.

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 41 km (east to west) by 53 km (north to south). The bounding coordinates of the model domain are 372000E, 6197000N (south-west) and 413000E, 6250000N (north-east) (GDA 1994, MGA Zone 54).

The rectangular model grid is divided into 410 columns and 530 rows with a regular model cell size of 100 m × 100 m over the entire domain, resulting in total of 651 900 finite difference cells over the three model layers.

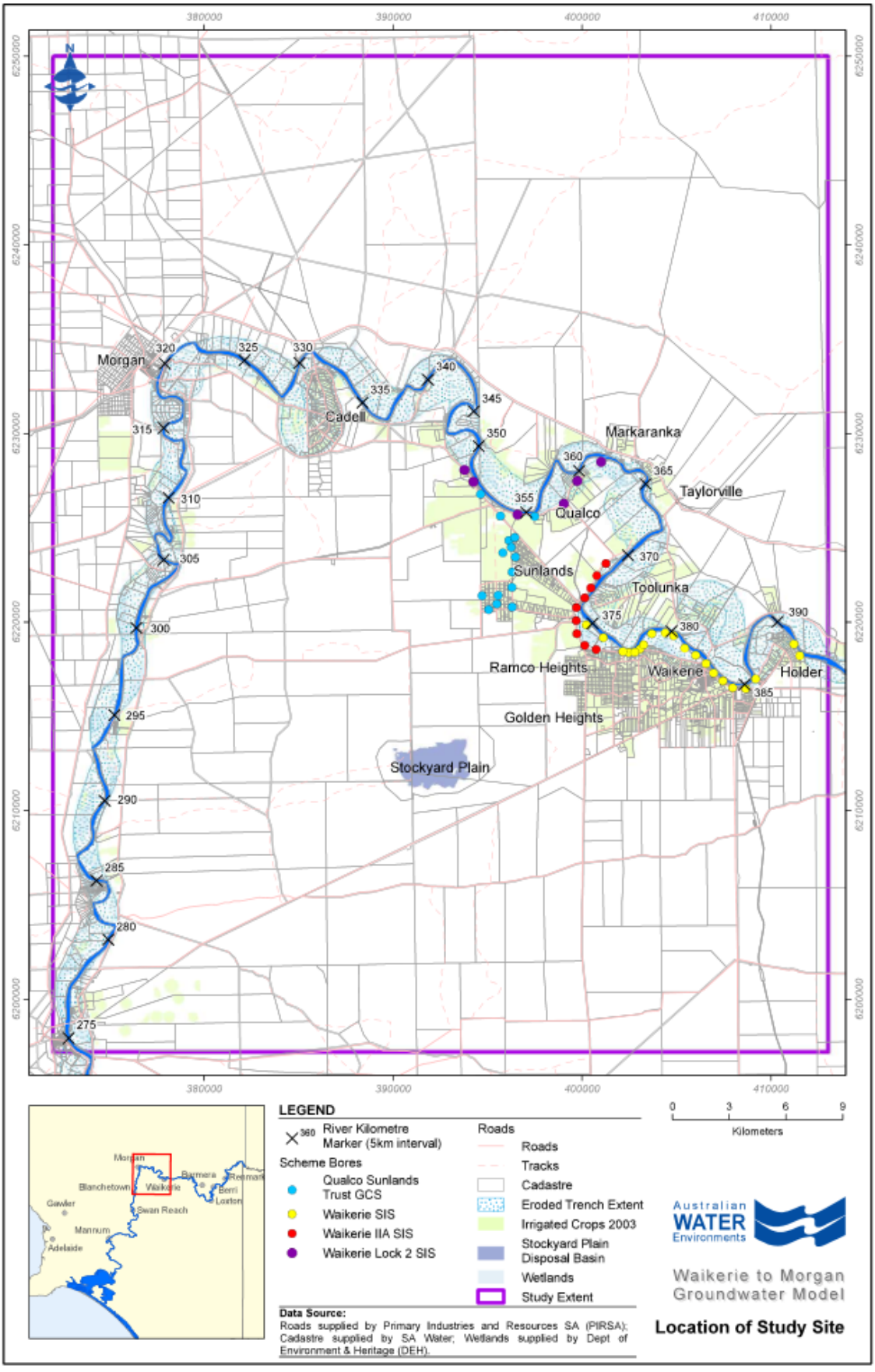

Figure 1. Waikerie to Morgan model domain

Model layers

The regional aquifer system in the Waikerie to Morgan 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	Highland Hydrogeological unit	Floodplain Hydrogeological unit	Aquifer/ Aquitard	MODFLOW layer
1	GF	MF/inactive	Aquifer	Type-3
2	FF & UMF	MF/FF & UMF	Aquitard	Type-3
3	LMF	LMF	Aquifer	Type-0

GF – Glenforslan Formation *LMF – Lower Mannum Formation* *MF – Monoman Formation*

FF & UMF – Finniss Formation and Upper Mannum Formation

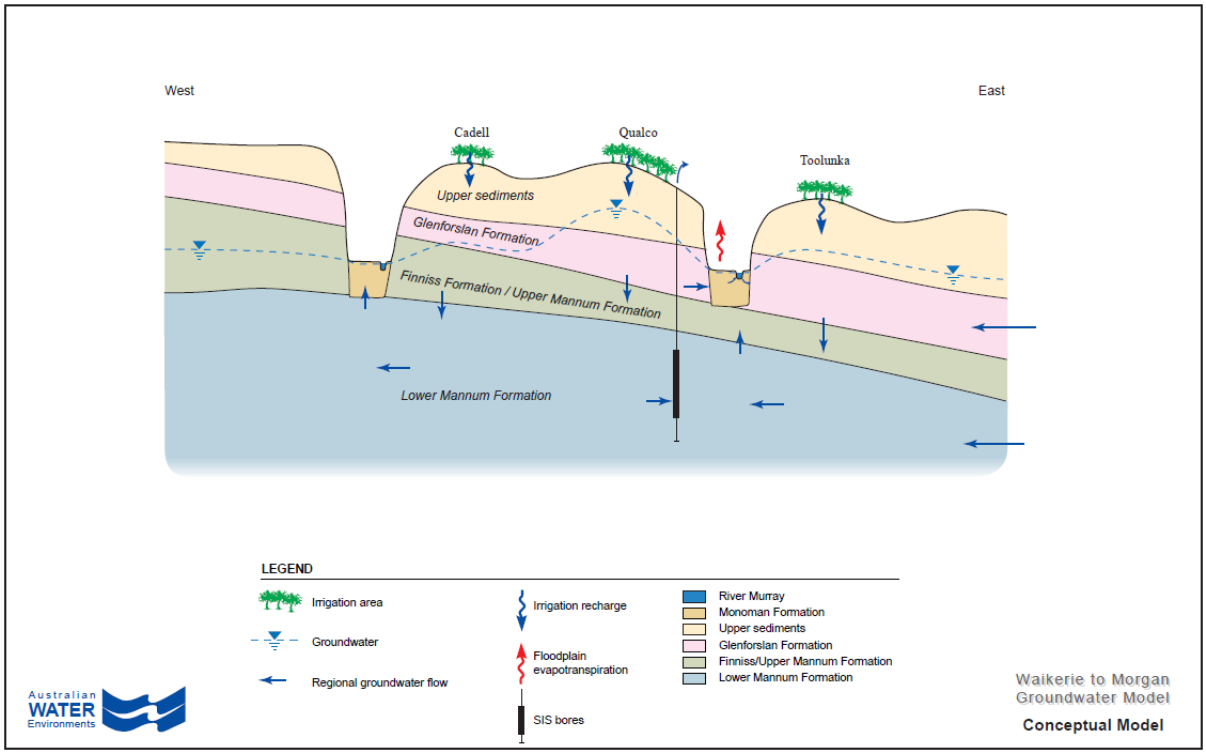

Figure 2. Conceptual Hydrogeological Model (Cross-section)

Reports

Yan W, Li C and Woods J, 2012, *Waikerie to Morgan Numerical Groundwater Model 2012*, Report DFW 2012/18, Department for Water, Adelaide

AWE 2011, *Waikerie to Morgan Groundwater Model Phase Two – Model Refinement and Recalibration*, prepared for Department for Water, Adelaide