COX CREEK CATCHMENT MODEL 2010

Purpose

The aim of this project, as described in Stewart and Green (2010), is to provide a tool to assist decision making in water resources management and water allocation planning in fractured rock aquifers (FRAs) of the Mount Lofty Ranges (MLR).

The objective of this study is to develop a numerical model of the groundwater systems in the Cox Creek Catchment area to achieve the following:

- Assess the regional scale impacts of increased licensed groundwater use from the FRA
- Assess the regional impact that climate change (decreased recharge) may have on the groundwater resource of the FRA
- Assess the regional scale impacts of changed land use conditions.

Background

From Stewart and Green (2010), the Mount Lofty Ranges provides important surface water and groundwater resources for domestic, industrial and agricultural purposes locally, as well as metropolitan Adelaide's reticulated water supply.

To improve the management of groundwater resources in fractured rock aquifers, the understanding of groundwater flow mechanisms occurring in these systems needs to be enhanced.

A numerical groundwater flow model was developed by the Department for Water to increase the understanding of the fractured rock aquifers groundwater systems present in Cox Creek Catchment. This model incorporates the understanding of the groundwater flow system to date and is generally capable of simulating the regional aquifer system of Cox Creek Catchment and enables predictive modelling of future scenarios, such as land use and climate change.

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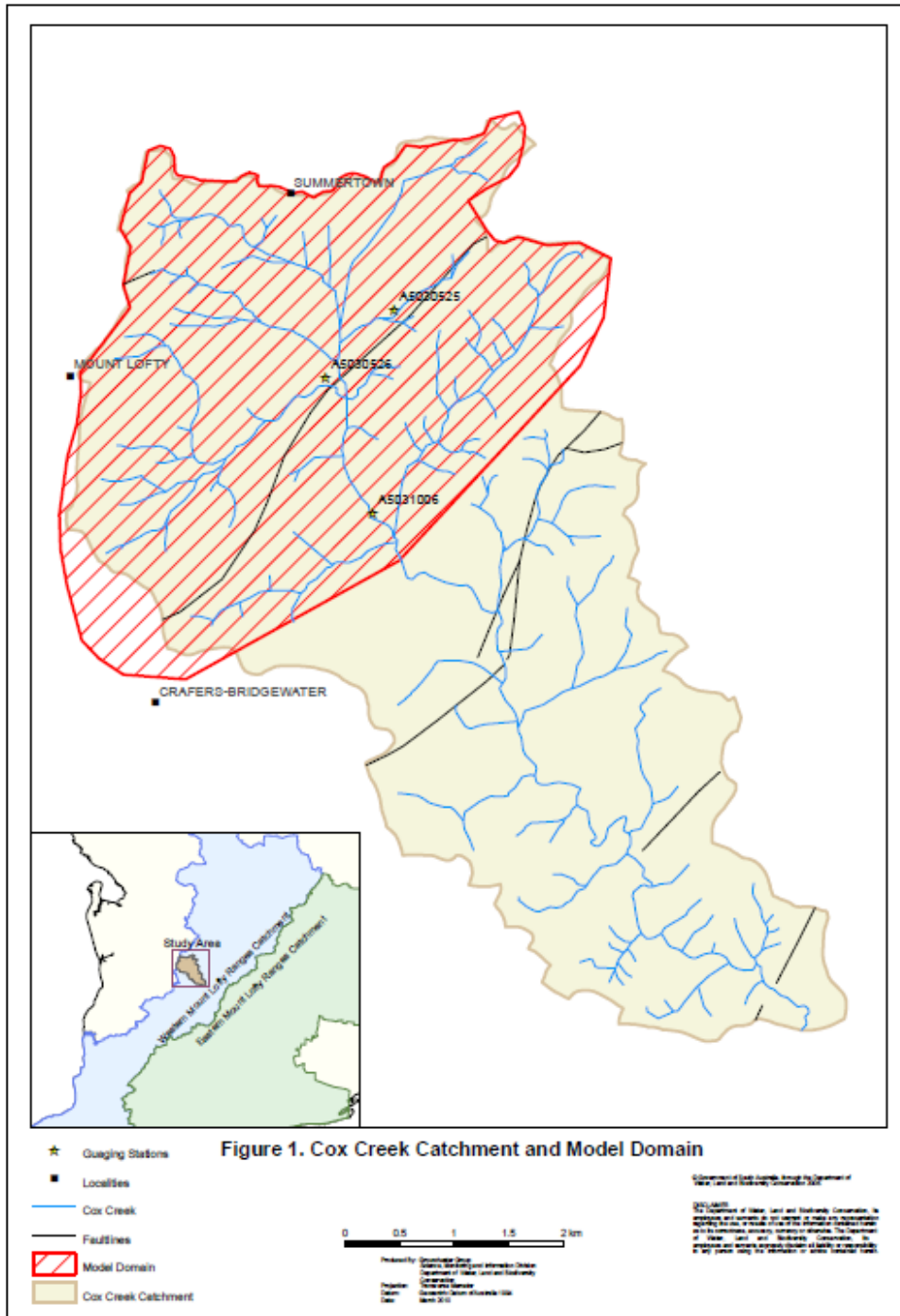
The location of the model domain is shown in Figure 1.

Figure 1. Cox Creek Catchment and Model Domain

Figure 1.   Model domain

Model structure

Visual MODFLOW 2009 was used as the interface for pre- and post-processing of MODFLOW files.

Model domain and grid size

The modelled area simulates an area of 16 km^2, 3.4 km (north–south) by 4.6 km (east–west). The bounding coordinates of the model domain are south-west 290680E, 6124570N and north-east 295780E, 6129840N (GDA 1994, MGA Zone 54).

The rectangular model grid was divided into 102 columns and 106 rows. The grid size was 50 x 50 m (Fig. 6).

Model layer

Due to the nature of the fractured rock aquifer present in the model domain, and as there are no confining layers present throughout the domain, the model was set up as a two layer model where layer 1 represents the active fracture zone, and layer 2 represents the fracture extinction zone.
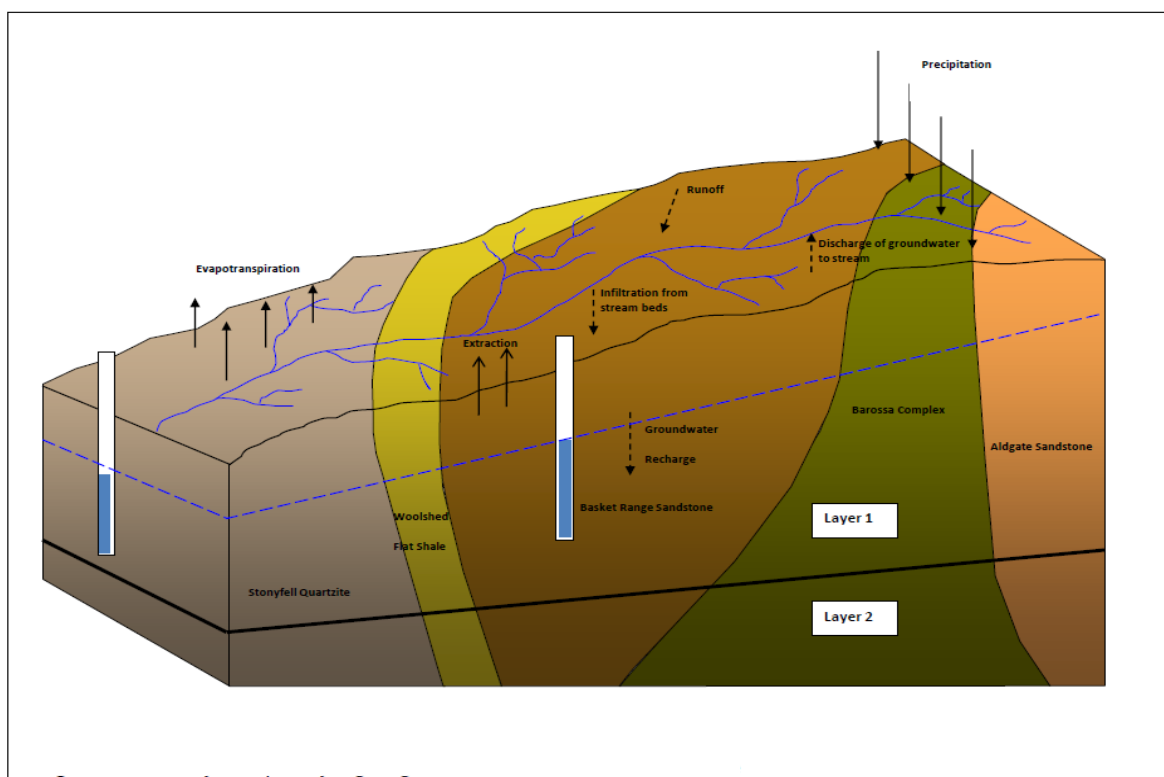

Figure 2. **Model layers and Hydrogeological conceptual model**

Report

Stewart S and Green G, 2010, Groundwater Flow Model of Cox Creek Catchment, Mount Lofty Ranges, South Australia, DFW Technical Report 2010/14, Department for Water, Adelaide