

ADELAIDE PLAINS MODEL 2010 (SKM)

Purpose

The objectives of the modelling study, as stated in REM (2005), are to:

- provide a decision support tool for determining sustainable groundwater yields from the Tertiary sedimentary aquifers within the Northern Adelaide Plains Prescribed Wells Area. Prediction model runs will be undertaken to examine the impacts on the groundwater resource of a range of groundwater abstraction regimes i.e. varying abstraction rates and varying abstraction distribution
- use the model to estimate the contribution of groundwater from the Western Mount Lofty Ranges to the Adelaide Coastal Plains Tertiary aquifers
- provide a modelling tool which can be used by water planners to make decisions regarding the sustainable levels of groundwater abstraction from sedimentary aquifers beneath the Adelaide metropolitan area.

Background

The Adelaide Plains numerical groundwater model was first developed by Resource and Environmental Management Pty Ltd (REM) in 2006. The current model (v2010) was last updated in February 2010.

The model covers the period from the beginning of 1900 to March 2059. Modelling of predictive scenarios starts from March 2004.

The model was built with Visual MODFLOW version 4.1.

Location

The active model domain includes the Adelaide Plains sedimentary aquifers, the Golden Grove Embayment and the Western Mount Lofty Ranges. It extends approximately 25 km offshore under the Gulf St Vincent. The location of the model domain is shown in Figure 1.

Model Structure

Model domain and grid size

The finite difference grid consists of 200 rows, 229 columns and six layers, resulting in 274 800 cells, 153 510 of which are active. A cell size of 460 m × 360 m is applied to the whole model except at the region from the western model boundary to approximately 10 km offshore, where the column width is increased to a maximum of 2500 m.

The model simulates an area 124.1 km (east to west) by 71.3 km (north to south). The model grid is rotated 30 degrees counter-clockwise. The bounding coordinates are X -25000 Y 0 (south-west) and X 99147.1 and Y 71290.2 (north-east), and the co-ordinate system is unknown (not stated in any report).

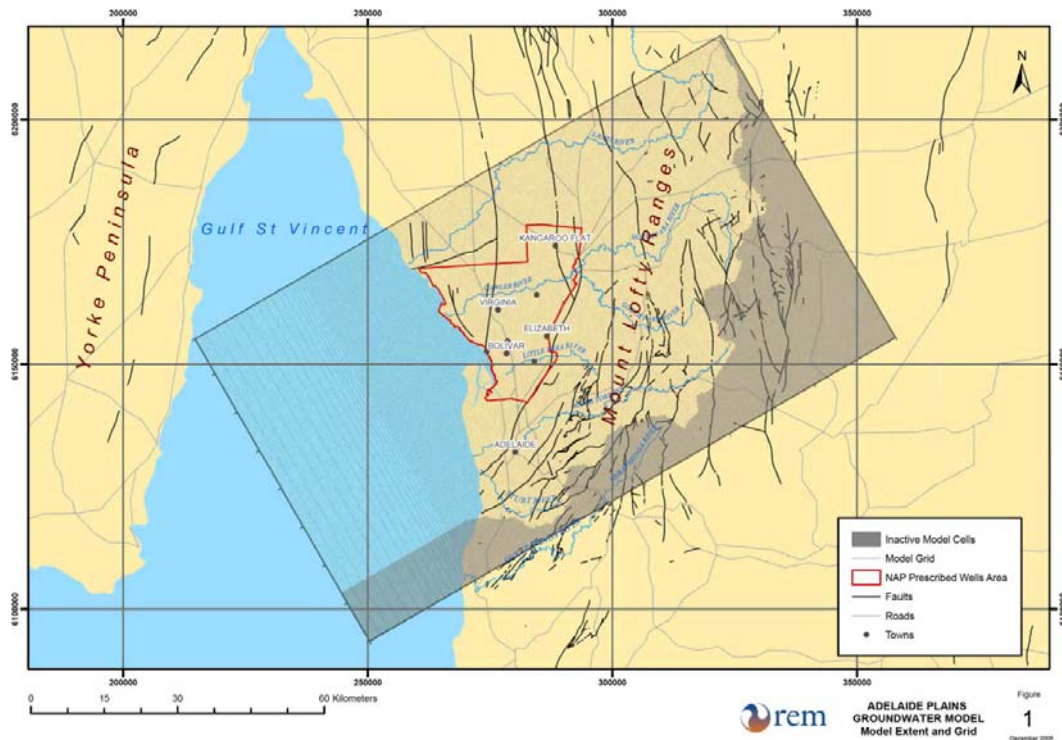


Figure 1. Adelaide Plains model domain (REM 2006)

Model layers

A summary of the simulated hydrostratigraphic units in the study area is presented in Table 1. The conceptual models for the Northern Adelaide Plains and the Central Adelaide Plains are shown in Figure 2 and Figure 3, respectively.

Table 1. Model layers (REM 2006)

Model Layer	Gulf St Vincent Discharge Zone	Adelaide Sub-Basin	Golden Grove Embayment				Western Mount Lofty Ranges Recharge Zone
			Zone 4	Zone 3	Zone 2	Zone 1	
1	Quaternary clays	Quaternary clays	Quaternary clays-	Quaternary clays-	Quaternary clays-	Quaternary clays-	Fractured rock aquifer
2	Quaternary clays	Quaternary clays	T aquifer	T aquifer	T aquifer	T aquifer	Fractured rock aquifer
3	Q4 aquifer	Q4 aquifer	T aquifer	Fractured rock aquifer	T aquifer	Fractured rock aquifer	Fractured rock aquifer
4	T1 Aquifer	T1 Aquifer	T aquifer	Fractured rock aquifer	Fractured rock aquifer	Fractured rock aquifer	Fractured rock aquifer
5	Munno Para Clay Aquitard	Munno Para Clay Aquitard	T aquifer	Fractured rock aquifer	Fractured rock aquifer	Fractured rock aquifer	Fractured rock aquifer
6	T2 Aquifer	T2 Aquifer	T aquifer	Fractured rock aquifer	Fractured rock aquifer	Fractured rock aquifer	Fractured rock aquifer

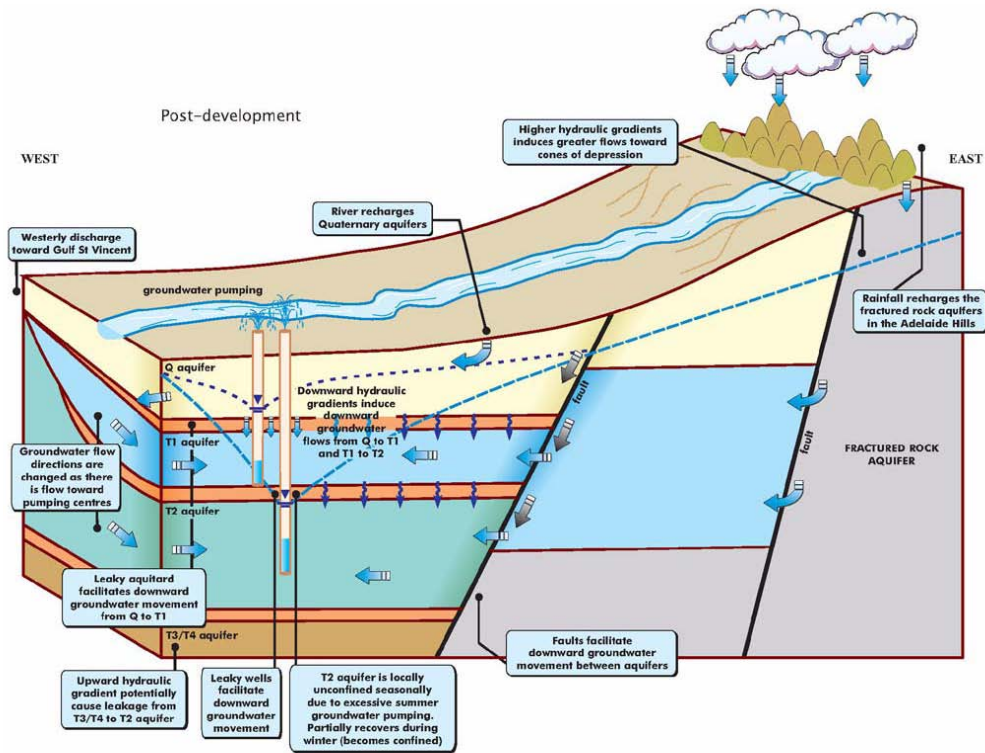


Figure 2. Conceptual model of the Northern Adelaide Plains (REM 2005)

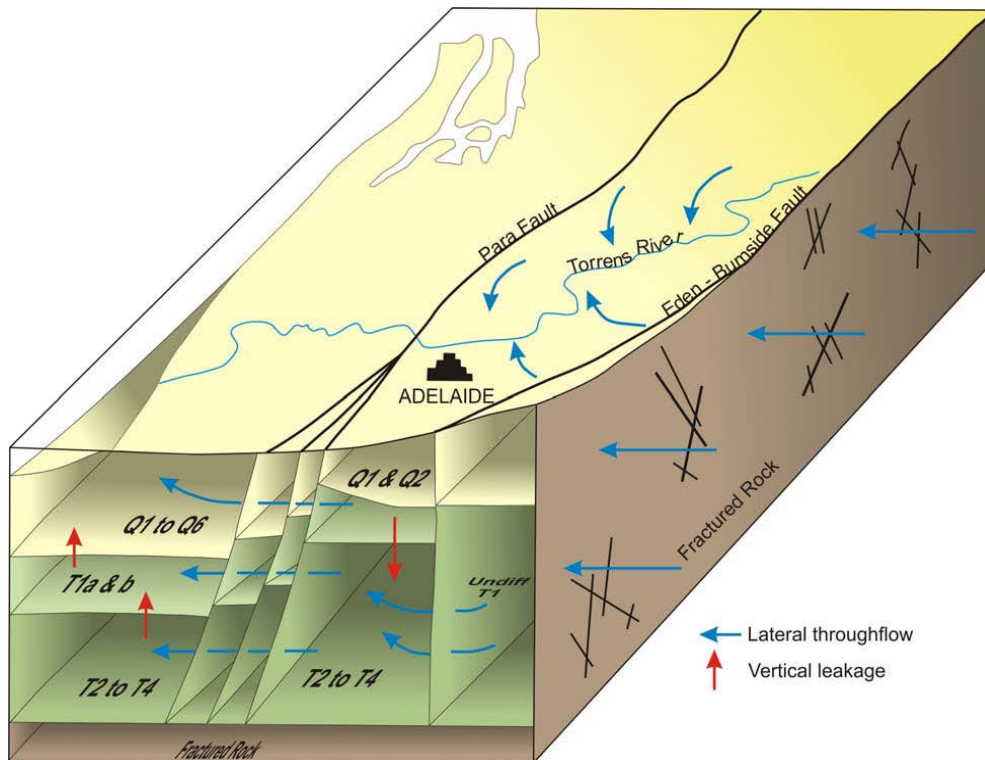


Figure 3. Conceptual model of the Central Adelaide Plains (SKM 2009)

Reports

Sinclair Knight Merz, 2010, *Adelaide Plains Model Update – Kangaroo Flat*, prepared for Adelaide and Mount Lofty Ranges Natural Resources Management Board

Sinclair Knight Merz, 2009, *Regional Groundwater Model Update*, prepared for Adelaide and Mount Lofty Ranges Natural Resources Management Board

Resource and Environmental Management, 2006, *Tertiary Aquifers of the Adelaide Coastal Plains Groundwater Model: Transient Model Set-up and Calibration Report*, prepared for North Adelaide and Barossa Catchment Water Management Board and The Department of Water, Land and Biodiversity Conservation

Resource and Environmental Management, 2006, *Tertiary Aquifers of the Adelaide Coastal Plains Groundwater Model: Steady-state Model Set-up*, prepared for North Adelaide and Barossa Catchment Water Management Board and The Department of Water, Land and Biodiversity Conservation

Resource and Environmental Management, 2005, *Tertiary Aquifers of the Adelaide Coastal Plains groundwater Model: Model Conceptualisation Report*, prepared for North Adelaide and Barossa Catchment Water Management Board and The Department of Water, Land and Biodiversity Conservation