

PADTHAWAY MODEL 2008

Purpose

From Aquaterra (2008), the objectives of the Padthaway model are to:

- quantify groundwater flow and salinity fluxes in the Padthaway study area
- provide a tool for evaluating future management options for the groundwater resource in the Padthaway region, particularly relating to the impacts on groundwater salinity of changing land and water use.

Background

As described in Aquaterra (2008), the background to this project is the three-year study “Padthaway Salt Accession Investigations and Determination of Sustainable Limits (PAV)” that was undertaken from 2002 to 2005 by the Department of Land, Water and Biodiversity Conservation (DWLBC) in the Padthaway area in the South East of South Australia. The aim of the study was to quantify and compare salt accession to the watertable under different land use practices in the Padthaway Prescribed Wells Area (PWA). The Salt Accessions study was comprehensive, with investigations covering the local geology, soil cover, hydrogeology, hydrology and geochemistry.

The model covers the period from 1950 to 2120. Modelling of predictive scenarios starts from 2006. The model was developed and the final draft report was completed in 2008.

The industry-standard MODFLOW and MT3DMS numerical groundwater flow and solute transport modelling packages have been used for this study, operating under two software packages:

- Visual MODFLOW V4.1 (Waterloo Hydrogeologic), as specified by DWLBC, was the package used for the initial development of the flow model
- PM Pro (IES, PM Pro (IES, 2006) was used for the final groundwater flow and solute transport model development.

The model was built with PMWIN.

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 38 km (east to west) by 33 km (north to south). The bounding co-ordinates are 432950E, 5928700N (south-west) and 471450E, 5962000N (north-east) (GDA 1994, MGA Zone 54).

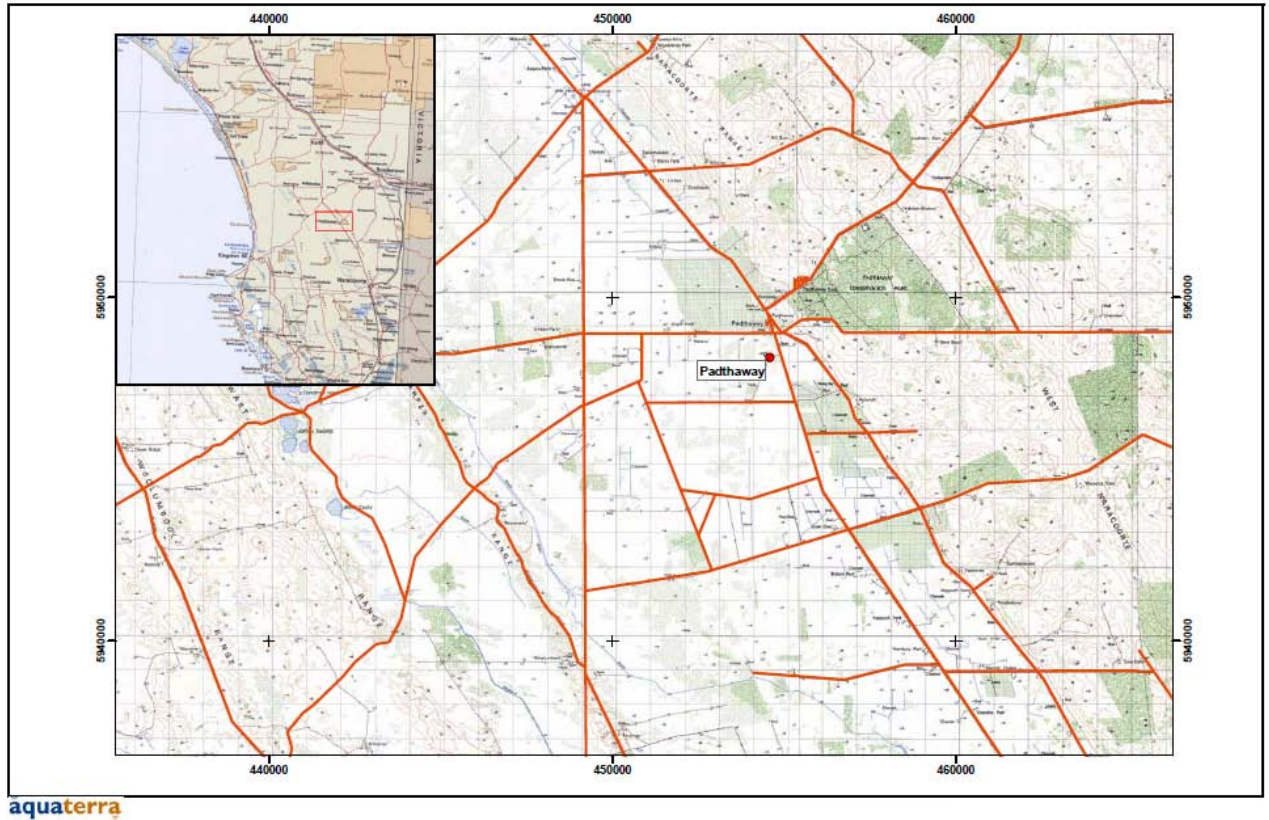


Figure 1. Padthaway model domain

The model consists of 333 rows and 385 columns. The grid has a uniform cell size of 100 m × 100 m. It is applied to three layers resulting in 384 615 finite difference cells, all of which are active.

Model layers

The regional aquifer system underlying the Padthaway region is conceptualised as three layers, 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	Padthaway and Bridgewater Formations	Aquifer	Type-1
2	Keppoch Clay underlying Padthaway Formation	Aquitard	Type-3
3	Coomandook Formation and Gambier Limestone	Aquifer	Type-3

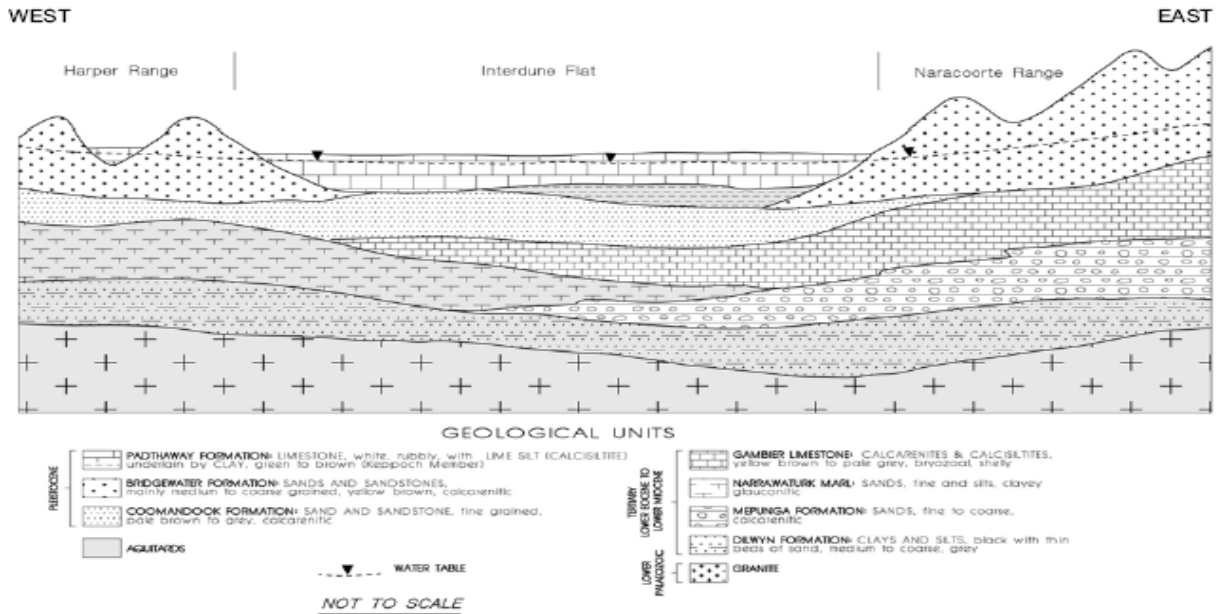
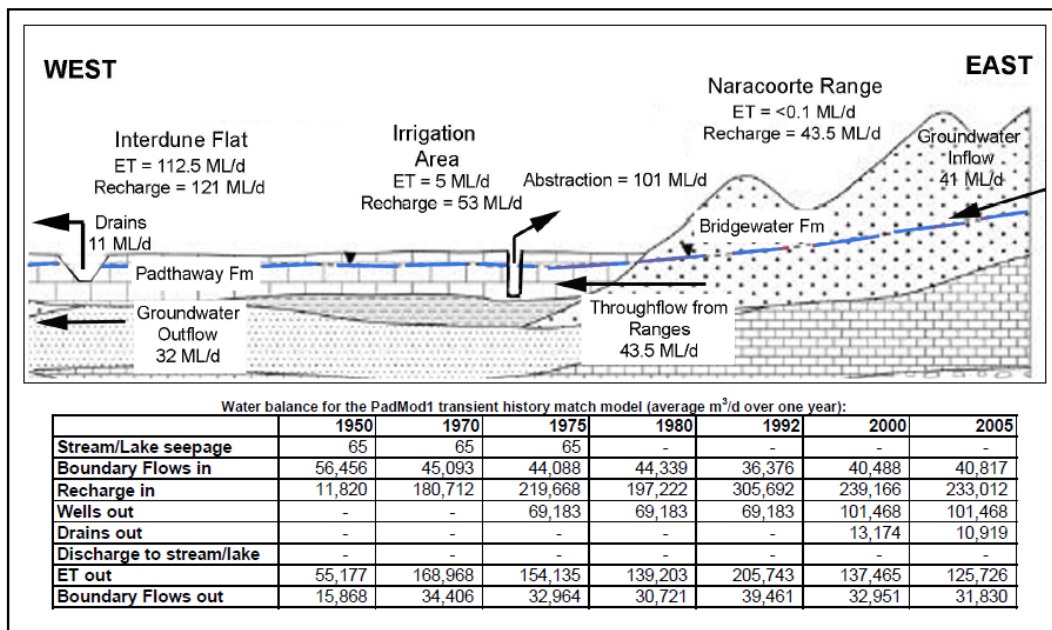


Figure 2. Cross-section

Summary of Padthaway Regional Groundwater Modelling Study (PadMod1)



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Figure 3. Hydrogeological conceptual and water balance model

Report

Aquaterra, 2008, *Padthaway Groundwater Flow and Solute Transport Model (PADMOD1)*, prepared for the Department of Water, Land and Biodiversity Conservation, Adelaide