GOYDER INSTITUTE FOR WATER RESEARCH MODEL METADATA TEMPLATE

METADATA REQUIRED	DETAILS
Model Name and version	*MODFLOW NETR – Net Recharge Package*
Date of lodgement of Metadata Template. Name of Metadata Provider	*Rebecca Doble* *PMB 2 Glen Osmond, SA 5245* Rebecca.doble@csiro.au +61 8 8303 8705
Goyder Institute Project Number and Name	GOYDER INSTITUTE FOR WATER RESEARCH Project No. 15/26 Goyder South East Regional Water Balance Project: A new approach for modelling groundwater recharge in the South East of South Australia using MODFLOW
Project Team	Rebecca Doble, Trevor Pickett, Russell Crosbie, Leanne Morgan
Creator/Developer	Trevor Pickett
Owner/Contact Person and contact details	Trevor Pickett CSIRO Land and Water Flagship ESP, Dutton Park, Brisbane Ph: 07 38335597 trevor.pickett@csiro.au
Model Location	The model is archived on the WRON server, at CSIRO. Please contact Mr Trevor Pickett (above) for its location. The model is also stored in DEWNR's Science Model Warehouse. The model is not in active further development.
IP or other permission requirements	********* **REFER TO GOYDER INSTITUTE FOR WATER RESEARCH AGREEMENT** ******* There are not any known IP issues to be aware of.
Licences associated with model and/or dependencies	********* **REFER TO GOYDER INSTITUTE FOR WATER RESEARCH AGREEMENT** ******* MODFLOW is freeware software provided by the USGS, USA. No licence is required for its operation.
Confidentiality agreements associated with model and/or dependencies	There are no confidentiality agreements associated with the model and/or the dependencies that future users need to be aware of.
Brief outline of model	The new MODFLOW net recharge package (NETR) reads a landscape key that is assigned to each grid cell and then reads the values of the piecewise linear function from a look-up table that has a row for each landscape key value and interpolates according to the exact depth to ground water. The NRF package can use a new look-up table and landscape key for each stress period or continue to use the same inputs as the previous time step,

	this enables both transient land use and transient net recharge relationships to be incorporated into the model.
Area/region covered	The South East of SA and part of western Victoria.
Platform and language and version	Fortran 77
METADATA REQUIRED	DETAILS
Dependencies upon: i) other models and/or platforms (including version) and location ii) essential data and data sources and location	This work required a groundwater model to be developed in MODFLOW using a graphical user interface. This process is described in the Model Stocktake information developed by Leanne Morgan for the South East MODFLOW model development. The model required net recharge functional curves to be developed using the WAVES model and R scripts, which are held by Rebecca Doble, CSIRO, and published in the Goyder report described below, and the WAVES Stocktake Report (see SE Waves35 model). It also required spatial information about the landscape classes developed from rainfall, land use and soil type maps. The landscape class data is held by Rebecca Doble, CSIRO.
How was model used	○ *Scenarios and outputs from various runs (provide a brief summary and indicate where these are stored)* The model calculated a spatial distribution of net recharge for the whole of the South East region, as an annual average for 2008 and the ten year annual average for the period 2000 to 2010. ○ *Assumptions behind model (provide a brief summary and indicate where these are stored)* The groundwater was assumed to behave in accordance with Darcy's Law, and that the major influences on evapotranspriation and recharge were climate, vegetation/landuse cover, soil type and depth to groundwater. A more detailed discussion of assumptions is provided in the report. ○ *Limitations of model(provide a brief summary)* With the current parameter set, the model has been developed for the South East region of South Australia and part of Western Victoria, for the period 2000 to 2010. ○ *Peer review process (if applicable)* The model and associated report have been reviewed internally by CSIRO and externally by the Goyder Technical Working Group and Science review

	panel. The work has also been presented at a major international conference. ○ *Extensibility of model (can it be run for different time periods)* The model can be run for other time periods and land use scenarios, as long as the landscape classes are updated, and the net recharge functional curves are updated using the WAVES model (see SE Waves35 model). Meteorological data will have to be updated if climate change scenarios are to be used.
Specificity of data	*Was data sourced from local field sites or literature* Data was sourced from SILO meteorological information, ASRIS soil mapping, and current land use maps provided by DEWNR.
Datasets/data products produced	*Include details of where datasets/products are located and contact details in the storage location* The model provided a proof of concept map of net recharge for the region.
Other Information	

METADATA REQUIRED	DETAILS
Publications (papers and technical reports)	Goyder Institute for Water Research Technical Reports: Harrington, N, Lamontagne, S, Crosbie, R, Morgan, L, Doble, R, Werner, A, 2015, *South East Regional Water Balance Project – Phase 2. Project Summary Report*. Goyder Institute for Water Research Technical Report 15/39, Adelaide, South Australia. Doble, RC, Pickett, T, Crosbie, RS and Morgan, LK. 2015, *A new approach for modelling groundwater recharge in the South East of South Australia using MODFLOW,* Goyder Institute for Water Research Technical Report Series No. 15/26, Adelaide, South Australia. Conference Proceedings: Doble RC, Pickett T, Crosbie RS, Morgan LK. Emulation of recharge and evapotranspiration processes in shallow groundwater environments for improved MODFLOW representation. Paper presented at the MODFLOW and More 2015: Modeling a Complex World, Golden, Colorado, USA, 31st May to 3rd June, 2015 Doble RC, Pickett T, Crosbie RS, Morgan LK. A MODFLOW lookup approach for best practise modelling of recharge and evapotranspiration. Paper presented at the South Australian Water Showcase, Adelaide, Australia, 17th and 18th February, 2015.
Collaborations and acknowledgements	This work was funded by the Goyder Institute for Water Research through the South East Regional Water Balance Project. Thanks to the following people for acting on the Technical Working Group for that project and providing useful feedback on various technical aspects: Okke Batelaan (Flinders University) Dirk Mallants (CSIRO) Glen Walker (formerly CSIRO) Graham Green (DEWNR) Saad Mustafa (DEWNR) Jeff Lawson (DEWNR) Chris Li (DEWNR)
Keywords	Modelling, groundwater recharge, regional models