GOYDER INSTITUTE FOR WATER RESEARCH MODEL METADATA TEMPLATE

METADATA REQUIRED	DETAILS
Model Name and version	Water Community Resource Evaluation and Simulation System (WaterCress)
Date of lodgement of Metadata Template. Name of Metadata Provider	April 2015 Mr Dennis Gonzalez (dennis.gonzalez@csiro.au)
Goyder Institute Project Number and Name	GOYDER INSTITUTE FOR WATER RESEARCH Project No. U.2.1 Managed Aquifer Recharge and Stormwater Use Options (MARSUO)
Project Team	Project Leader: Dr Peter Dillon (previously CSIRO, pdillon500@gmail.com) Project Team: Mr Dennis Gonzalez (dennis.gonzalez@csiro.au) Dr Steve Charles (steve.charles@csiro.au) Mr Richard Clark (Clark & Assoc., richardc@chariot.net.au) Mr David Cresswell (Clark & Assoc., cresswell@internode.on.net) Mr Bruce Naumann (City of Salisbury, bnaumann@salisbury.sa.gov.au)
Creator/Developer	Richard Clark & David Cresswell (Clark & Associates) http://www.waterselect.com.au
Owner/Contact Person and contact details	Mr Dennis Gonzalez Liveable, Sustainable and Resilient Cities Program CSIRO Land and Water Flagship dennis.gonzalez@csiro.au
Model Location	*Where is the model archived?* Clark & Associates Mr Richard Clark (Clark & Assoc., richardc@chariot.net.au) *Is there a version of the model in active further development?* *Where is this active version located?* See above.
IP or other permission requirements	********* **REFER TO GOYDER INSTITUTE FOR WATER RESEARCH AGREEMENT** ******* *Are there any IP issues associated with the model and/or the dependencies that future users need to be aware of?* WaterCress model output files available on request; contact Owner/Contact. WaterCress model software is free (no licence required).

METADATA REQUIRED	DETAILS
Licences associated with model and/or dependencies	********* **REFER TO GOYDER INSTITUTE FOR WATER RESEARCH AGREEMENT ******* WaterCress is free software available via WaterSelect, no licence is required; http://www.waterselect.com.au Rainfall data input to WaterCress model was an output from the Goyder 'Development of an agreed set of climate change projections for South Australia' project. These data are publicly available and free for use for non-commercial purposes through the Enviro Data SA website: https://data.environment.sa.gov.au/Climate
Confidentiality agreements associated with model and/or dependencies	*Are there any confidentiality agreements associated with the model and/or the dependencies that future users need to be aware of?* Raw data provided by the City of Salisbury under agreement with the Goyder Institute MARSUO project. Future users may need to contact the City of Salisbury for flow gauge, volume and water quality data. City of Salisbury contact: Mr Bruce Naumann bnaumann@salisbury.sa.gov.au
Brief outline of model	A daily time step hydrological model for the Parafield stormwater harvesting and aquifer storage and recovery system to simulate rainfall-runoff, surface capture, aquifer storage and supply to meet customer demand.
Area/region covered	Parafield, South Australia (-34.791884°, 138.626322°).
Platform and language and version	WaterCress is coded in the C++ language and will run on any PC using a 32-bit Windows operating system. WaterCress runs from a single executable file (i.e. it does not require a third-party platform).

Dependencies upon:
  i) other models and/or platforms (including version) and location
  ii) essential data and data sources and location
	i) WaterCress runs from a single executable file (i.e. it does not require a third-party platform).
	ii) Rainfall driven model requiring a daily rainfall sequence; calibration of rainfall-runoff requires flow gauge data; calibration of aquifer storage depreciation rate requires injected and recovered water quality and volume data; input rainfall data were generated through the Goyder Institute project 'Development of an agreed set of climate change projections for South Australia' project (see Technical Report 15/1 Charles and Fu, 2015 http://goyderinstitute.org/index.php?id=20); flow gauge data for the Parafield Drain Station provided by the City of Salisbury (2002-08) and CSIRO (2011-12); injected and recovered water quality and volume data provided by CSIRO and City of Salisbury.

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How was model used	o *Parameterisation/Validation (if applicable; provide a brief summary and include time period of calibration/simulation)* Parameterisation fully described in Clark et al. (in prep.); time period of calibration 2002-2012; time period of simulations 1959-2009 and 2010-2060. o *Scenarios and outputs from various runs (provide a brief summary and indicate where these are stored)* Scenarios included: base case (current conditions); projected rainfall under climate change; increased impervious area; increased surface detention time; decreased aquifer injection rate; different aquifer storage depreciation rates; minimum aquifer storage volume. Summary results of model simulations stored at CSIRO (\\fssa2-adl\clw-share6\recharge, see Owner/Contact); Raw output files stored with Clark & Associates. Mr Richard Clark (Clark & Assoc., richardc@chariot.net.au) o *Assumptions behind model (provide a brief summary and indicate where these are stored)* Model assumptions are fully described in Clark et al. (in prep.). o *Limitations of model(provide a brief summary)* Application of model to different study sites will require site specific data for parameterisation and calibration; a full description of limitations is provided in Clark et al. (in prep.). o *Peer review process (if applicable)* Internal CSIRO (ePublish) review of manuscript and journal peer review process as part of publication process. o *Extensibility of model (can it be run for different time periods)* The model could be run for any time period within the period 1959-2060. To go outside this period would require generation of input data. The framework is universally applicable.

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Specificity of data	*Was data sourced from local field sites or literature* Data sources included: • Monthly pan evaporation at Parafield Airport weather station #23013 from the Bureau of Meteorology • Flow gauge data (Parafield Drain Station) • Synthetic rainfall data downscaled to from global climate models to the Parafield Airport weather station #23013 • Monthly aquifer injection and extraction volumes for ASR wells • Measured salinity of injected and recovered water
Datasets/data products produced	*Include details of where datasets/products are located and contact details in the storage location* Summary results of model simulations stored at CSIRO (\\fssa2-adl\clw-share6\recharge, see Owner/Contact); raw input and output files stored with Clark & Associates.
Other Information	WaterCress is free software available via WaterSelect, no licence is required; http://www.waterselect.com.au

METADATA REQUIRED	DETAILS
Publications (papers and technical reports)	Dillon P., Page, D., Dandy, G., Leonard, R., Tjandraatmadja, G., Vanderzalm, J., Rouse, K., Barry, K., Gonzalez, D. and Myers, B. 2014. *Managed Aquifer Recharge Stormwater Use Options: Summary of Research Findings*, Goyder Institute for Water Research, Technical Report 14/13. Charles SP and Fu G, 2015, *Statistically Downscaled Projections for South Australia,* Goyder Institute for Water Research Technical Report Series No. 15/1, Adelaide, South Australia Clark, R., Gonzalez, D., Cresswell, D., Dillon, P., Naumann, B., & Charles, S. (in prep). *Reliability of water supply from stormwater harvesting via managed aquifer recharge in a changing climate and urbanising catchment*. (Submitted to Journal of Environmental Modelling and Software, for status update contact D. Gonzalez). Gonzalez, D., Clark, R., Dillon, P, Charles, S., Cresswell, D. and Naumann, B. 2015, *Reliability of stormwater supplies via managed aquifer recharge accounting for urbanisation and climate change*. Goyder Institute For Water Research Annual Conference 2015 - Water Research Showcase, Adelaide, South Australia, 17-18 Feb 2015. Gonzalez, D., Clark, R., Dillon, P, Charles, S., Cresswell, D. and Naumann, B. 2015, *Modelling effects of climate change and urbanisation on supply reliability of stormwater harvesting and managed aquifer recharge*. Ozwater'15, Adelaide, South Australia, 12-14 May 2015.
Collaborations and acknowledgements	The authors acknowledge support of the partners to the Managed Aquifer Recharge and Stormwater Use Options research project. These are the National Water Commission through the Raising National Water Standards Program, the South Australian Government through the Goyder Institute for Water Research, CSIRO Water for a Healthy Country Program, City of Salisbury, the Adelaide and Mt Lofty Ranges Natural Resources Management Board, University of Adelaide, University of South Australia, South Australian Water Corporation and the former United Water International. The authors also acknowledge the authors, collaborators and partners of the Goyder Institute project C.1.1 'Development of an agreed set of climate change projections for South Australia' project.
Keywords	WaterCress; downscaling; MAR; runoff; artificial recharge; reliability

MARSUO project partners