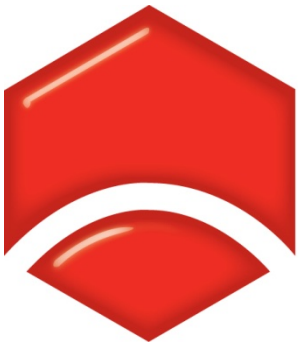

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PROJECT 7: BASEFLOW FOR CATCHMENT SIMULATION

Data collation and catchment characteristics

APRIL, 2010

Project Project 7: Baseflow for Catchment Simulation	**AR&R Report Number** P7/S1/004
Date 15 April 2010	**ISBN**
Contractor Sinclair Knight Merz	**Contractor Reference Number** VW04648
Authors Rachel Murphy, Zuzanna Graszkiewicz, Peter Hill, Rory Nathan	**Verified by** James Ball

ACKNOWLEDGEMENTS

This project was made possible by funding from the Federal Government through the Department of Climate Change. This report and the associated project are the result of a significant amount of in kind hours provided by Engineers Australia Members.

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FOREWORD

AR&R Revision Process

Since its first publication in 1958, Australian Rainfall and Runoff (AR&R) has remained one of the most influential and widely used guidelines published by Engineers Australia (EA). The current edition, published in 1987, retained the same level of national and international acclaim as its predecessors.

With nationwide applicability, balancing the varied climates of Australia, the information and the approaches presented in Australian Rainfall and Runoff are essential for policy decisions and projects involving:

- infrastructure such as roads, rail, airports, bridges, dams, stormwater and sewer systems;
- town planning;
- mining;
- developing flood management plans for urban and rural communities;
- flood warnings and flood emergency management;
- operation of regulated river systems; and
- estimation of extreme flood levels.

However, many of the practices recommended in the 1987 edition of AR&R are now becoming outdated, no longer representing the accepted views of professionals, both in terms of technique and approach to water management. This fact, coupled with greater understanding of climate and climatic influences makes the securing of current and complete rainfall and streamflow data and expansion of focus from flood events to the full spectrum of flows and rainfall events, crucial to maintaining an adequate knowledge of the processes that govern Australian rainfall and streamflow in the broadest sense, allowing better management, policy and planning decisions to be made.

One of the major responsibilities of the National Committee on Water Engineering of Engineers Australia is the periodic revision of AR&R. A recent and significant development has been that the revision of AR&R has been identified as a priority in the Council of Australian Governments endorsed National Adaptation Framework for Climate Change.

The Federal Department of Climate Change announced in June 2008 $2 million of funding to assist in updating Australian Rainfall and Runoff (AR&R). The update will be completed in three stages over four years with current funding for the first stage. Further funding is still required for Stages 2 and 3. Twenty one revision projects will be undertaken with the aim of filling knowledge gaps. The 21 projects are to be undertaken over four years with ten projects commencing in Stage 1. The outcomes of the projects will assist the AR&R editorial team compiling and writing of the chapters of AR&R. Steering and Technical Committees have been established to assist the AR&R editorial team in guiding the projects to achieve desired outcomes.

Project 7: Baseflow for Catchment Simulation

An important aspect of flow estimation as distinct from flood estimation is the relative importance of the baseflow component of a hydrograph. Whereas the direct runoff component is the most significant component of a hydrograph for flood estimation and the baseflow component is neglected, this is not always the case for general flow estimation. In recent years the need to estimate small flood flows (in-bank floods) has arisen and, therefore, estimation of baseflow needs to be considered within Australian Rainfall and Runoff.

This project focuses on the development of appropriate techniques for estimating the baseflow component of a hydrograph. It is expected that both statistical and deterministic approaches be developed to meet the various needs of the industry.

This project will result only in preliminary guidance in a form suitable for inclusion in Australian Rainfall and Runoff. It is expected that further developments will occur post this edition of Australian Rainfall and Runoff.

The aim of Project 7 is to identify and test techniques for estimation of the baseflow component of a flood hydrograph for situations where the baseflow cannot be neglected as a significant component of the flood hydrograph.

Mark Babister
Chair National Committee on Water Engineering

Dr James Ball
AR&R Editor

AR&R REVISION PROJECTS

The 21 AR&R revision projects are listed below:

AR&R Project No.	Project Title
1	**Development of intensity-frequency-duration information across Australia**
2	Spatial patterns of rainfall
3	Temporal pattern of rainfall
4	**Continuous rainfall sequences at a point**
5	**Regional flood methods**
6	Loss models for catchment simulation
7	**Baseflow for catchment simulation**
8	Use of continuous simulation for design flow determination
9	**Urban drainage system hydraulics**
10	**Appropriate safety criteria for people**
11	**Blockage of hydraulic structures**
12	Selection of an approach
13	**Rational Method developments**
14	Large to extreme floods in urban areas
15	**Two-dimensional (2D) modelling in urban areas.**
16	Storm patterns for use in design events
17	Channel loss models
18	**Interaction of coastal processes and severe weather events**
19	Selection of climate change boundary conditions
20	Risk assessment and design life
21	IT Delivery and Communication Strategies

AR&R Technical Committee:

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Members	Mark Babister, MIEAust CPEng, Chair NCWE, WMAwater
	Professor George Kuczera, MIEAust CPEng, University of Newcastle
	Professor Martin Lambert, FIEAust CPEng, University of Adelaide
	Dr Rory Nathan, FIEAust CPEng, SKM
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	Associate Professor Ashish Sharma, UNSW
	Dr Michael Boyd, MIEAust CPEng, Technical Project Manager *

*Indicates paid EA member of Committee

Related Appointments:
Technical Committee Support: Monique Retallick, GradIEAust, WMAwater
Assisting TC on Technical Matters: Michael Leonard, University of Adelaide

PROJECT TEAM

The following people were involved in Update Project 7:

- Dr Michael Boyd (AR&R TC)
- Dr Rory Nathan (AR&R TC and SKM)
- Rachel Murphy (SKM)
- Zuzanna Graszkiewicz (SKM)
- Peter Hill (SKM)
- Brad Neal (SKM)
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1. Introduction

Book V, Section 2 of Australian Rainfall and Runoff (Cordery, 1998) provides methods for estimating surface runoff during flood events, but does not currently provide any guidance on estimating the component of the flood hydrograph sourced from baseflow. Baseflow is generally a minor component in extreme flood events, but can potentially be significant in smaller flood events. This is particularly the case where the catchment geology consists of high yielding aquifers with large baseflows.

The focus of Australian Rainfall and Runoff Update Project 7 (Baseflow for Catchment Simulation) is to recommend practical yet technically robust preliminary advice on the estimation of baseflow in design flood events for inclusion in Australian Rainfall and Runoff.

A separate report has been prepared that describes the outcomes of Phase 1 of the Project, which focused on the selection of the baseflow separation approach for application at a national scale. That report (SKM, 2009) summarises the data collection and demonstration of the method to eight case study catchments across Australia. This current report accompanies a database of catchment characteristics and hourly streamflow data from case study catchments. The ongoing work as a part of Update Project 7 (Phase 2 of the project) will build on the tasks completed to date, in particular the:

1) Development of prediction equations in case study catchments;
2) Application of the prediction equations across Australia; and
3) Testing of the recommended procedures.

This report is provided to support the database of catchment characteristics and hourly streamflow data from case study catchments. The following provides a summary of the report structure:

- Section 2 provides a summary of the catchment selection process;
- Section 3 outlines the catchment characteristics of interest;
- Conclusions are summarised in Section 4;
- References are provided in Section 5;
- Data acknowledgements are provided in Section 6;
- A list of all selected study catchments is provided in Appendix A; and
- Details of the spatial datasets metadata are provided in Appendix B.

2. Catchment selection

Streamflow data is available across Australia at approximately 10,000 streamflow gauging stations, which are located in a variety of landscapes and have recorded data over different periods of record. For the purposes of this study, only a selection of these are considered relevant for the development of a national approach to estimate baseflow contribution to the design flood peak. This section describes the approach taken to select streamflow gauging stations for assessment.

2.1. Selection criteria

In order to identify sites of interest, a number of selection criteria were established:

- **Unimpaired sites.** Regulating structures, return flows and diversions modify streamflow characteristics and can complicate the identification of the baseflow component of flow events. For simplicity, streamflow records from sites that are unimpaired from flow management conditions were selected.
- **Availability of hourly flow data.** Since the baseflow contribution to flood events is to be identified through this study, it is necessary to obtain streamflow data at high frequency time steps. Only streamflow gauges that capture instantaneous flow (which can be aggregated to hourly data) were selected.
- **Availability of 20 years of record.** A significant period of recorded data is required to ensure that a range of flood events are captured within the time series data. 20 years of record was selected as the criteria for selecting suitable data sets.
- **Significant missing data.** Missing streamflow data, particularly during flood events, restricts the usefulness of the data set for analysis. As such, streamflow gauges with less than 10% of missing data were considered appropriate for this study.

Work undertaken for the National Land and Water Resources Audit (Peel et al, 2000) identified 331 unimpaired catchments with over 10 years of data across Australia. The catchments identified in that study were used as a starting point for site selection for this assessment. Of the 331 sites, 201 locations were identified that also met the selection criteria of this study.

Additionally, concurrent work on other Australian Rainfall and Runoff Revision projects has identified 227 sites with over 25 years of annual maximum flood data in NSW and Victoria for the purposes of regional flood estimation. Of these, over 100 were consistent with the sites identified by Peel et al (2000). Additional sites which also met the criteria listed above were selected for inclusion in this assessment.

Furthermore, work undertaken in Victoria for the Sustainable Diversion Limit project (SKM, 2003) identified 204 catchments less than 1000 km^2 in area with more than 10 years of data (less than 5% missing). This site list was compared with those developed by Peel et al (2000) and other Australian Rainfall and Runoff revision projects to ensure a thorough site selection process was undertaken.

The sites selected from the above data sets were primarily distributed throughout the eastern areas of Australia. To improve on the spatial distribution of sites, a number of additional streamflow gauges were selected in Western Australia, Tasmania, Northern Territory and Queensland. These sites were identified based on compliance with the criteria listed above ensuring reasonable spatial distribution across Australia.

Preliminary work through Stages 1 and 2 of this study enabled some further data checks to be made, to ensure that the sites identified were suitable for this study. This included data quality checks, based on the appropriate data quality codes, and discussions with the relevant state agencies to confirm local conditions.

A total of 266 streamflow gauge locations were identified as potentially relevant for this study through this site selection process. Figure 1 displays a histogram of the length of record available at the selected sites and the location of these catchments is presented in Figure 2. A complete list of these sites is provided in Appendix A.

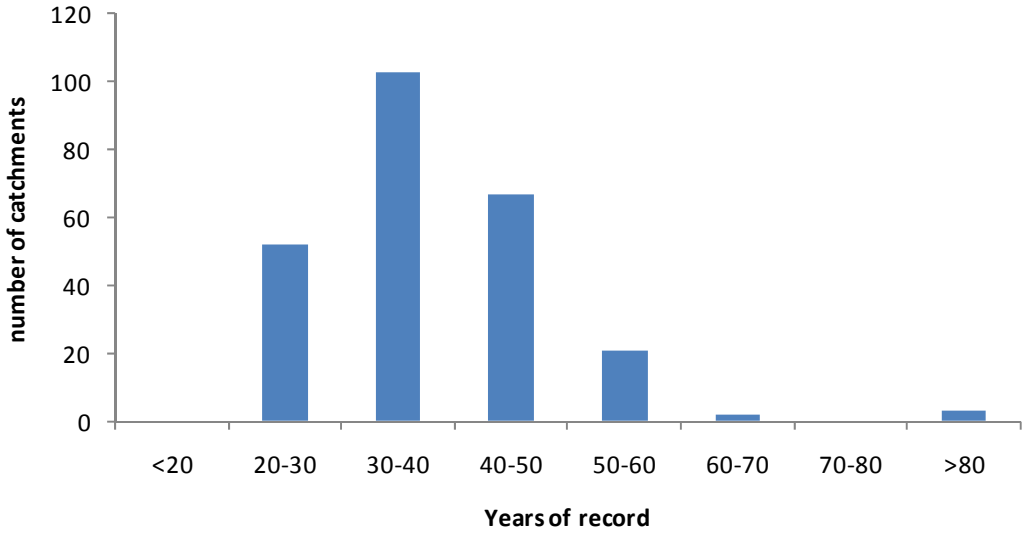

Figure 1 Length of record of selected sites

2.2. Data acquisition

For each catchment identified through the process above, a range of data was required for this project. Data collated included hourly streamflow data, maximum and average daily streamflow data, associated quality codes, and gauge rating information. River level data was also obtained for some locations.

Streamflow data is captured by a range of organisations across Australia. However, the Bureau of Meteorology has been delegated the responsibility of transforming Australia's water resources information network to develop and maintain an integrated national water information system. Water Regulations that support these activities require various organisations to provide water information to the Bureau. Although the national water information system is still in early stages of development, the Bureau has commenced the collation of streamflow data from relevant

organisations across Australia. Validation of the data collated through this process is an ongoing function of the Bureau.

Of the 266 catchments identified as relevant for analysis in this study, data from a number of sites had already been collated by the Bureau at the time of this project. Hourly streamflow data, maximum and average daily data, and associated quality codes were sourced from the Water Division of the Bureau of Meteorology for sites as available.

Data from the remaining sites were sourced directly from the relevant agency, as listed below:

- Thiess Hydrographic Services, as custodians of water data in Victoria, provided data as required.
- The Pinneena 9 DVD database was used to source data on sites in NSW.
- Data for sites in South Australia were obtained from the Science, Monitoring and Information Division of the Department of Water, Land and Biodiversity Conservation in Adelaide.
- The Department of Environment and Resource Management provided data for Queensland catchments as required.
- Data for gauge locations in Tasmania were primarily sourced from the Water Assessment Branch of the Department of Primary Industries, Parks, Water and Environment based in Hobart, Tasmania. Data captured by Hydro Tasmania act were sourced directly from this organisation.
- Information on sites in the Northern Territory was obtained from the Natural Resources Division of the Department of Natural Resources, Environment, The Arts and Sports in Darwin.
- The Water Information Branch of the Department of Water provided data for Western Australian catchments.

Hourly streamflow data has been collated for all of the 266 study catchments and is provided in a database associated with this report. The hourly streamflow data files are formatted with the date and time in the first columns (in the format of YYYYMMDDHH, where YYYY=year, MM=month, DD=day and HH=hour), followed by the streamflow data values. Missing data periods are identified with values of -99.999. Based on discussions with the relevant state agencies, quality codes associated with the hourly flow records were used to filter periods of poor quality data. As each data provider uses a different approach to assign data quality, the following information summarises the filtering criteria applied to exclude poor quality data records for the purposes of this study:

- Data supplied from agencies in Victoria, Northern Territory, South Australia, New South Wales, and from the Bureau of Meteorology: data with quality codes of 150 or less were considered suitable for this study. Data with quality codes greater than 150 were excluded.
- Data supplied from the Queensland Department of Environment and Resource Management: Data with quality codes of 125 or less were retained. Data with quality codes greater than 125 were excluded.
- For all Tasmanian sites: Data with quality codes of 30 or less, and quality codes of 32 and 34, were retained. Other quality codes greater than 30 were excluded.
- For Western Australian sites: Streamflow data with a quality code of 4 or less was retained. For streamflow data records with a quality code of 11 or 12, the quality code of the original

level data was used to confirm quality. Of these instances, all level data with a quality code of 4 or less was retained. Streamflow data with a quality code greater than 4, other than 11 and 12, was excluded.

No further checks have been made to the data, and the hourly streamflow records are supplied in the associated database ‘as is’. All data is provided in units of m^3/s. The database provides further guidance on this data.

Appropriate acknowledgement of the data provided to date, and associated licence agreements are provided in Section 6.

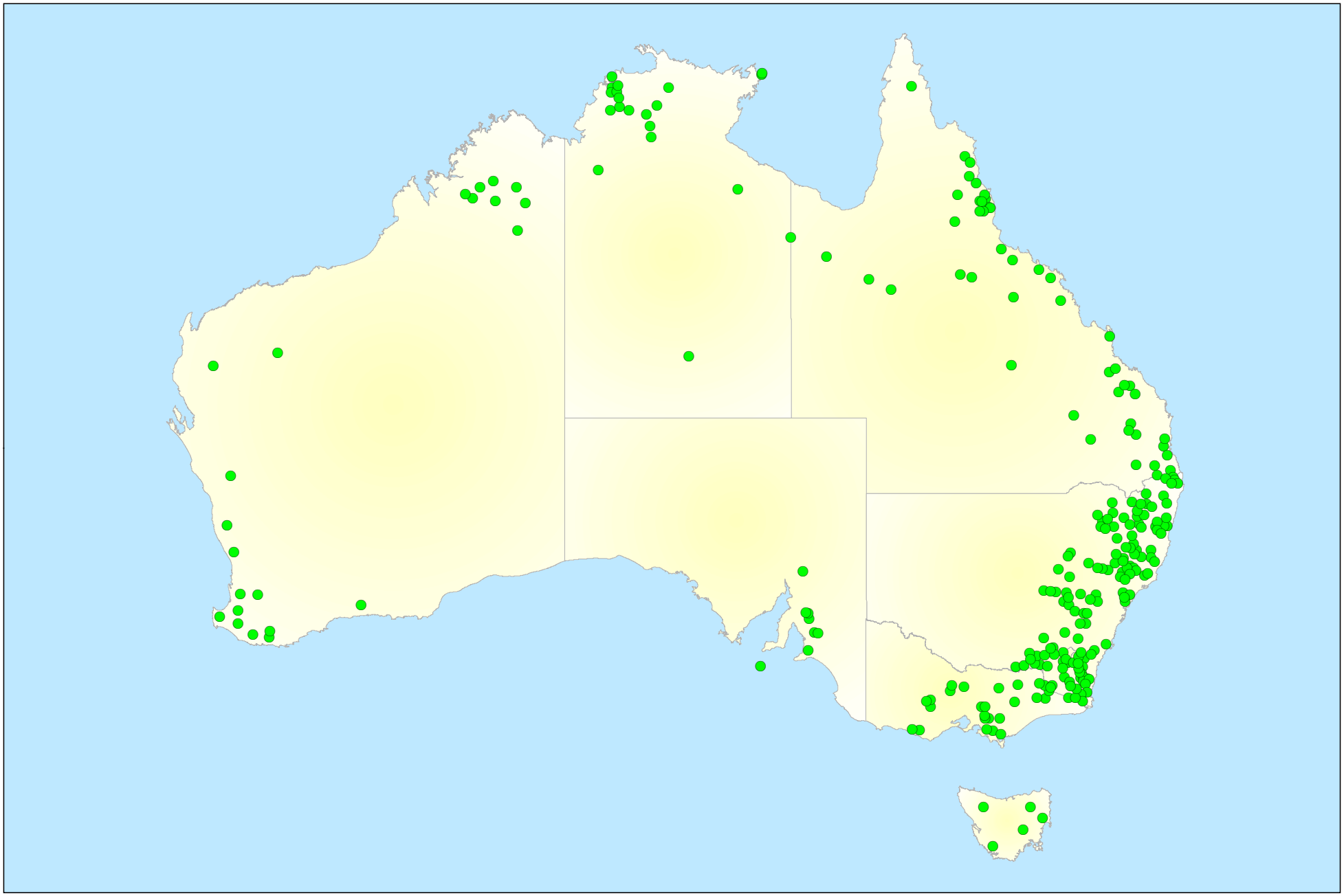

Figure 2 - Gauge Locations of Selected Sites

SINCLAIR KNIGHT MERZ

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3. Catchment Characteristics

A range of catchment, hydrologic and climate characteristics have been identified as potential drivers for regional variation in baseflow. These characteristics include information captured within a range of data sets relating to streamflow, climate (precipitation and evaporation), vegetation cover, soil type, geological conditions, and topography. The key features of interest and the source data sets are summarised in Table 1. Further details about each of the data sets are provided in Section Appendix B.

Table 1 Catchment characteristics

Characteristic	Statistics	Units	Source
CLIMATE CHARACTERISTICS			
Precipitation	Mean annual precipitation Spatial variability in annual: Minimum Maximum Range Standard deviation	mm/yr	BOM mean annual rainfall data. Climatic Atlas of Australia (BOM, 2000).
Evapotranspiration	Mean annual evapotranspiration Spatial variability in annual: Minimum Maximum Range Standard deviation	mm/yr	BOM mean annual evapotranspiration data. Climatic Atlas of Australia (BOM, 2001).
CATCHMENT CHARACTERISTICS			
Catchment Area	Catchment Area	km^2	Catch 2000 and existing SDL and National Land and Water Resources Audit catchments
Location	Latitude of catchment centroid Longitude of catchment centroid	Degrees Degrees	GEODATA 9 second DEM version 3 (Geoscience Australia)
Elevation	Maximum Minimum Mean Range Standard deviation	m m m m m	GEODATA 9 second DEM version 3 (Geoscience Australia)
Slope	Maximum Minimum Mean Range Standard deviation	Degrees Degrees Degrees Degrees Degrees	GEODATA 9 second DEM version 3 (Geoscience Australia)
Aspect	Proportion of catchment facing north, south, east and west	% of catchment	GEODATA 9 second DEM version 3 (Geoscience Australia)
Woody vegetation	Proportion of catchment with woody vegetation	% of catchment	Forest extent and change (v4), Department of Climate Change

Characteristic	Statistics	Units	Source
Soil type	Average soil depth across catchment	m	Digital Atlas of Australian Soils, BRS and CRC Catchment Hydrology interpretation. (CRC for Catchment Hydrology, 2004)
	Average plant available water holding capacity across catchment	mm	
	Top soil layer thickness	m	
	Top soil layer saturated hydraulic conductivity	mm/hr	
	Top soil layer saturated volumetric water content	m	
	Top soil layer nominal field water capacity	m	
	Top soil layer nominal wilting point water capacity	m	
	Lower soil layer thickness	m	
	Lower soil layer saturated hydraulic conductivity	mm/hr	
	Lower soil layer saturated volumetric water content	m	
	Lower soil layer nominal field water capacity	m	
	Lower soil layer nominal wilting point water capacity	m	
Geology Relevant geological classifications identified, refer to comments below	Number of stream junctions per geology classification	Number/km^2	Surface geology of the states of Australia 1:1,000,000 scale, prepared by Geoscience Australia. Geological classifications based on interpretation as discussed below.
	Reach length intersecting each geology classification	km	
	Stream density in each geology classification	m/km^2	
	Area of each geology classification within each catchment	m^2	
	Percentage of catchment area intersecting each geology classification within a catchment	% of catchment area	
	Weighted average conductivity based on proportion of catchment with each geology classification	m/day	
	Weighted storage ranking based on proportion of catchment with each geology type	% of aquifer volume	
	Weighted average conductivity based on proportion of river reach intersecting each geology classification	m/day	
	Weighted storage ranking based on proportion of river reach intersecting each geology type	% of aquifer volume	
Impervious area	Area of catchment in urban area	m^2	Built up areas dataset, GEODATA TOPO 250k
	Proportion of catchment in	% of catchment area	

Characteristic	Statistics	Units	Source
	urban area		series 3 topographic data, GeoScience Australia
STREAM CHARACTERISTICS			
Stream length	Stream length	m	GEODATA TOPO 250k series 3 topographic data, GeoScience Australia
Stream frequency	Number of stream junctions per unit catchment	Number/km^2	GEODATA TOPO 250k series 3 topographic data, GeoScience Australia
Stream density	Stream length within a catchment Stream length per unit catchment area	m m/km^2	GEODATA TOPO 250k series 3 topographic data, GeoScience Australia

Most of these characteristics can be extracted directly from the relevant data source without significant analysis. Characterisation of the geological properties requires more detailed analysis, given the combination of a number of geology types within any given area and the varying influence of these different geological conditions on groundwater-surface water interaction. The following text summarises the approach taken to consolidate the geological data into a format that is applicable for the development of regression analyses in the next phase of the study.

Aquifer hydraulic parameters can influence baseflow volumes and timing via two potential mechanisms. The two most significant are considered to be hydraulic conductivity and storage characteristics (in particular, specific yield). The hydraulic conductivity of an aquifer influences the rate at which water can flow through the aquifer. [The hydraulic conductivity of an aquifer could also be indicative of higher permeability soils and hence higher recharge (and hence higher baseflow), however for the purposes of this assessment it is assumed that this effect will be captured via inclusion of a soil permeability parameter in the regression analysis].

For two aquifer systems with the same amount of recharge, the lower hydraulic conductivity aquifer will transmit water more slowly through the aquifer, hence is more likely to have shallower watertables and hence more likely to create opportunities for other groundwater discharge mechanisms (i.e., to wetlands, groundwater ET etc) and therefore have lower baseflow than the same aquifer system with higher hydraulic conductivity. In other words, higher hydraulic conductivity is expected to positively correlate with baseflow.

The storage properties of an aquifer define the amount of water stored within the rock / sediment. Typically sedimentary (porous media) aquifers can store more water than fractured rock aquifers and hence, generally, these types of aquifers will have greater volumes available for release as baseflow. In other words, a higher storage coefficient (or specific yield) is expected to positively correlate with baseflow. Specific yield, also known as the drainable porosity, is a ratio, less than or equal to the effective porosity, indicating the volumetric fraction of the bulk aquifer volume that a given aquifer will yield when all the water is allowed to drain out of it under the forces of gravity. Specific yield can be close to effective porosity, but there are several subtle factors which make this value more complicated. Some water always remains in the formation, even after

drainage; it clings to the grains of sand and clay in the formation. Also, the value of specific yield may not be fully realised until very large time scales, due to complications caused by unsaturated flow. The storage ranking term is used in this analysis as an approximation of specified yield.

A description of every geological unit occurring in Australia was compiled from Geoscience Australia at a 1:1,000,000 scale. 5,909 units have been mapped at this scale across Australia. The descriptions are not hydraulically focused. For example, the degree of fracturing or weathering of rock and the karstic nature of limestone are generally not included in the geologic descriptions. Rarely, the homogeneity or degree of sorting of grain sizes was indicated for sedimentary rocks or alluvium. Therefore, hydraulic interpretation was generally confined to mineral composition and relative grain sizes. Based on these geologic descriptions, each of these units was categorised into 7 broad classes based on a general classification of hydraulic conductivity and storage capacity. The rankings and classes are presented in Table 2. As can be seen from the table, the relative importance of hydraulic conductivity and storage ranking values are generally consistent for each lithology classification.

Table 2 Geological classes for analysis

Lithology	Hydraulic conductivity (m/d)	Storage ranking (% aquifer volume)
Alluvial - coarse grained (gravels/sands)	15	15
Alluvial - medium grained (fine to med-grained sands)	5	7.5
Alluvial ('general' or undifferentiated- sands, silts, clays or fine-grained)	2	5
Colluvial	10	10
Limestone	10	20
Basalt	5	5
Sandstone	0.5	1
Igneous & metamorphic rocks, conglomerates, mudstones, siltstones, conglomerate, shale, phyllite, chert, BIF	0.05	1
Fractured sandstone in GAB Basin, WA and Canning Basin, WA	10	5
Water	n/a	n/a

The Western Australian sandstone formations included in the second last class include:

- Great Artesian Basin (GAB), WA: Cadna-owie Formation (Wyandra Sandstone), Hooray Sandstone, Gilbert Formation, Mooga Sandstone, Gubberamunda Sandstone, Pilliga Sandstone, Hutton Sandstone, Precipice Sandstone, Clematis Group
- Canning Basin, WA: Broome Sandstone, Wallal Sandstone, Erskine Sandstone, Poole Sandstone, Liveringa Group (ferruginous, micaceous silty sandstone and conglomeratic sandstone), and Grant Group (undivided: massive aqueoglacial deposits, poorly sorted silty sandstone, conglomeratic sandstone, siltstone and shale)

In some instances, a small proportion of the catchment is defined as ‘water’ in the Geoscience Australia geology data set. These areas are reflected in last class in Table 2, and generally relate to lakes and waterways in the catchment.

Characterisation of the geological information is presented using a combination of this information for each catchment, taking into account the proportion of the catchment made up of

each geology type or the length of reach intersecting each geology type and the associated hydraulic conductivity or storage ranking for the relevant geology types. The catchment characteristic database includes four calculations that may be relevant to understand the influence of geological conditions on baseflow contribution to streamflow:

- Weighted average conductivity based on proportion of catchment with each geology classification (m/day)
- Weighted storage ranking based on proportion of catchment with each geology type (% aquifer volume)
- Weighted average conductivity based on proportion of river reach intersecting each geology classification (m/day)
- Weighted storage ranking based on proportion of river reach intersecting each geology type (% aquifer volume)

It should be noted that areas of water have been excluded from these weighted average calculations. These various characteristics will be considered further in the development of the prediction equations in Phase 2 of the study.

4. Conclusions

This report provides a summary of the selection process to identify case study catchments for analysis in ARR Update Project 7. Catchment characteristics of interest are also been listed, and the relevant data source to obtain these characteristics has been identified.

An associated database provides details of these characteristics in each of the selected study catchments. These features will be used in Phase 2 of the study in the development of prediction equations to estimate baseflow contribution to flood events.

A process of data collation has been undertaken to obtain streamflow data for study catchments. This data was sourced from the Bureau of Meteorology and relevant State Agencies. A link from the catchment characteristics database provides access to hourly streamflow records at the majority of the study catchments. This data is provided ‘as is’, with limited data checks undertaken prior to database collation.

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6. Acknowledgements

Where available, the Bureau of Meteorology provided data from their consolidated collection of streamflow data from across Australia.

Data from South Australia has been sourced from the Department of Water, Land and Biodiversity Conservation. The following disclaimer is provided with the data: the information/data is based on current records of water information. It is presented in good faith as the best available record in this format. The Minister for Environment and Conservation is not obliged to issue revised information/data. The Minister for Environment and Conservation accepts no liability for effects arising from the use of the information.

Some of the Western Australian streamflow data used in this report were obtained from the Water Information System (WIN) and Hydstra database, managed by the Department of Water, Water Information Provision Section, Perth, Western Australia. Information supplied by the Department of Water is protected by the Copyright Act 1968. That copyright belongs to the State of Western Australia. Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the Copyright Act 1968, no part may be reproduced or reused for any purpose without the written permission of the Department of Water.

Streamflow data from NSW were sourced from version 9 and 9.2 of the Pinneena database (2006 and 2008). This data is compiled by the NSW Department of Water and Energy, Dumaresq-Barwon Border Rivers Commission, Manly Hydraulics Laboratory, Murray-Darling Basin Authority and State Water.

Streamflow data for the majority of gauge locations in Tasmania were primarily sourced from the Water Assessment Branch of the Department of Primary Industries, Parks, Water and Environment based in Hobart, Tasmania. Data captured by Hydro Tasmania were sourced directly from this organisation.

Streamflow data for sites in the Northern Territory was obtained from the Natural Resources Division of the Department of Natural Resources, Environment, The Arts and Sports in Darwin, and is used in accordance with the conditions of licences for the use of digital data and information (licences DNRM2006/0038.427A and B).

Thiess Hydrographic Services, as custodians of water data in Victoria, provided streamflow data for some Victorian sites.

The Department of Environment and Resource Management provided streamflow data for Queensland catchments as required.

Streamflow data from sites within the ACT were provided under an agreement with ACTEW.

Appendix A Selected catchments

The following tables provide a list of all catchments selected for analysis in this study.

State	Site Number	Site Name	Latitude	Longitude
ACT	410730	Cotter River @ Gingera	-35.66	148.83
	410731	Gudgenby River @ Tennent	-35.74	149.00
	410733	Coree Creek @ Threeways	-35.33	148.84
	410736	Orroral River @ Crossing	-35.60	148.92
Northern Territory	G0060046	Todd River @ Wigley Gorge	-23.55	133.94
	G8110004	East Baines River @ Victoria Highway	-16.13	130.34
	G8140001	Katherine River @ Railway Bridge	-14.39	132.39
	G8140008	Fergusson River @ Railway Bridge	-13.91	132.25
	G8140011	Dry River @ Manbulloo Boundary	-14.82	132.44
	G8140040	Daly River @ Mount Nancar	-13.76	130.83
	G8140063	Douglas River Downstream Old Douglas Homestead	-13.75	131.56
	G8140161	Green Ant Creek @ Tipperary	-13.60	131.18
	G8150097	East Finniss River @ Rum Jungle	-12.97	130.99
	G8150098	Blackmore River @ Tumbling Waters	-12.85	130.89
	G8150127	Rapid Creek Downstream Mcmillans Road	-12.41	130.89
	G8150180	Finniss River @ Gitchams	-13.05	130.83
	G8170066	Coomalie Creek @ Stuart Highway	-13.02	131.08
	G8170084	Adelaide River @ Tortilla Flats	-13.25	131.16
	G8170085	Acacia Creek @ Stuart Highway	-12.77	131.11
	G8200045	South Alligator River @ El Sherana	-13.55	132.66
	G8210007	Magela Creek @ Upstream Bowerbird Waterhole	-12.86	133.13
	G8260052	Upper Latram @ Upstream Eldo Road Crossing	-12.32	136.83
	G8260054	Yirrkala Creek @ Yirrkala Mission	-12.25	136.86
	G9070132	McArthur River @ M. I. M. Pump	-16.91	135.89
South Australia	A4260504	Finniss River @ 4km East Of Yundi	-35.24	138.68
	A5050504	North Para River @ Turretfield	-34.53	138.93
	A5050517	North Para River @ Penrice	-34.56	139.07
	A5060500	Wakefield River @ Near Rhynie	-33.99	138.71
	A5070500	Hill River @ Andrews	-33.76	138.68
	A5070501	Hutt River @ Near Spalding	-33.74	138.60
	A5090503	Kanyaka Creek @ Sth Of Hawker	-32.09	138.48
	A5130501	Rocky River @ Flinders Chase (Ki)	-35.88	136.78
Tasmania	61	Hellyer Guilford Junction	-41.47	145.65
	76.1	North Esk at Ballroom Offtake	-41.46	147.54
	473.1	Davey D/S Crossing Rv - 10 Metre	-43.04	146.04
	2200.1	Swan at The Grange	-41.93	148.01
	4201.1	Jordan River @ Mauriceton	-42.40	147.24

State	Site Number	Site Name	Latitude	Longitude
Queensland	110003A	BarronRiver @ PicnicCrossing	-17.34	145.50
	119003A	Haughton River @ Powerline	-19.72	146.81
	121002A	Elliott River @ Guthalungra	-20.09	147.85
	122003A	Proserpine River @ Peter Faust Dam Tailwater	-20.41	148.32
	125002	Pioneer River @ Sarich's	-21.32	148.73
	129001A	Waterpark Creek @ Byfield	-22.75	150.68
	130319A	Bell Creek @ Craiglands	-24.17	150.66
	132001A	Calliope River @ Castlehope	-24.03	150.91
	142001A	Caboolture River @ Upper Caboolture	-27.11	152.82
	145018A	Burnett Creek @ U/S Maroon Dam	-28.27	152.58
	105101A	Normanby River @ Battle Camp	-15.58	144.93
	105105A	East Normanby River @ Developmental Road	-15.84	145.12
	111005A	Mulgrave River @ The Fisheries	-17.28	145.75
	111007A	Mulgrave River @ Peets Bridge	-17.12	145.69
	112002A	Fisher Creek @ Nerada	-17.60	145.87
	112003	North Johnstone River @ Glen Allyn	-17.38	145.60
	112101B	South Johnstone River @ Upstream Central Mill	-17.61	145.93
	113004A	Cochable Creek @ Powerline	-17.77	145.65
	116015A	Blunder Creek @ Wooroora	-17.76	145.50
	120102A	Keelbottom Creek @ Keelbottom	-19.28	146.38
	120303A	Suttor River @ St Anns	-21.20	146.86
	120305A	Native Companion Creek @ Violet Grove	-23.89	146.77
	120307A	Cape River @ Pentland	-20.39	145.19
	130302A	Dawson River @ Taroom	-25.89	149.25
	135002A	Kolan River @ Springfield	-24.72	151.47
	135004A	Gin Gin Creek @ Dam Site	-25.03	151.70
	136106A	Burnett River @ Eidsvold	-24.98	151.04
	136111A	Splinter Creek @ Dakiel	-24.69	151.26
	136301A&B	Stuart River @ Weens Bridge	-26.66	151.73
	136303A	Boyne River @ Dunollie	-26.22	151.51
	136315A	Boyne River @ Carters	-26.48	151.43
	143028A	Ithaca Creek @ Jason Street	-27.46	152.97
	143110A	Bremer River @ Adams Bridge	-27.89	152.46
	143303A	Stanley River @ Peachester	-26.82	152.86
	145102A&B	Albert River @ Bromfleet	-28.09	153.09
	422213A	Balonne River @ Weribone	-26.84	149.92
	422333	Condamine River @ Loudouns Bridge	-27.86	151.74
	912103	Lawn Hill Creek @ Lawn Hill No 2	-18.81	137.99
	913006	Gunpowder Creek @ Gunpowder	-19.57	139.41
	915013	Flinders River @ Glendower	-20.29	144.73
	915206	Dugald River @ Railway Crossing	-20.48	141.10
	915208	Julia Creek @ Julia Creek	-20.89	141.99
	917107	Elizabeth Creek @ Mount Surprise	-18.16	144.52
	919005	Rifle Creek @ Fonthill	-16.64	145.36
	919013	McLeod River @ Mulligan Highway	-16.38	145.09
	919310	Walsh River @ Rookwood	-17.12	144.62
	925001	Wenlock River @ Moreton	-12.79	142.81

State	Site Number	Site Name	Latitude	Longitude
Western Australia	601001	Young River @ Neds Corner	-33.45	120.90
	603136	Denmark River @ Mt Lindesay	-34.73	117.25
	604001	Kent River @ Rocky Glen	-34.47	117.26
	606001	Deep River @ Teds Pool	-34.62	116.61
	608151	Donnelly River @ Strickland	-34.17	116.00
	610001	Margaret River @ Willmots Farm	-33.90	115.28
	611111	Thomson Brook @ Woodperry Homestead	-33.65	116.00
	613002	Harvey River @ Dingo Road	-33.01	116.09
	614196	Williams River @ Saddleback Road Bridge	-33.04	116.80
	617002	Hill River @ Hill River Springs	-30.28	115.57
	617003	Gingin Brook @ Bookine Bookine	-31.34	115.84
	701002	Greenough River @ Karlanew Peak	-28.29	115.71
	705001	Minilya River @ Minilya Bridge	-23.93	115.02
	706003	Ashburton River @ Nanutarra	-23.40	117.59
	802137	Fitzroy River @ Dimond Gorge	-17.37	126.24
	802198	Margaret River @ Me No Savvy	-18.51	127.13
	802213	Hann River @ Phillips Range	-16.57	126.17
	803002	Lennard River @ Mt Herbert	-17.24	125.34
	803003	Fletcher River @ Dromedary	-17.09	125.04
	804001	Isdell River @ Dales Yard	-16.82	125.64
	808001	Durack River @ Nettopus Pool Karunjie	-16.82	127.07
	809310	Ord River @ Bedford Downs	-17.42	127.44
Victoria	222004	Little Plains River @ Wellesley (Rowes)	-37.14	149.03
	222206A	Buchan River @ Buchan	-37.15	148.11
	222213A	Suggan Buggan River @ Suggan Buggan	-36.85	148.25
	223202	Tambo River @ Swifts Creek	-37.14	147.78
	224201	Wonnangatta River @ Waterford	-37.31	146.90
	226007A	Tyers River @ Browns	-37.94	146.32
	227202A	Tarwin River @ Meeniyan	-38.45	146.04
	227211B	Agnes River @ Toora	-38.58	146.36
	227219A	Bass River @ Loch	-38.38	145.78
	228206B	Tarago River @ Neerim	-37.94	145.87
	228212	Bunyip River @ Tonimbuk	-37.95	145.73
	229214	Little Yarra River @ Yarra Junction	-37.84	145.70
	235203B	Curdies River @ Curdie	-38.43	143.12
	236203A	Mount Emu Creek @ Skipton	-37.49	143.55
	236212A	Brucknell Creek @ Cudgee	-38.39	142.81
	401012	Murray River @ Biggara	-36.64	148.10
	401212A	Nariel Creek @ Upper Nariel	-36.55	147.89
	402206A	Running Creek @ Running Creek	-36.61	147.01
	403213A	Fifteen Mile Creek @ Greta South	-36.77	146.27
	405205A	Murrindindi River @ Murrindindi above Colwells	-37.49	145.57
	405209B	Acheron River @ Taggerty	-37.48	145.72
	405229A	Wanalta Creek @ Wanalta	-36.70	144.88
	406214A	Axe Creek @ Longlea	-36.86	144.34
	407220	Bet Bet Creek @ Norwood	-37.19	143.55
	407253	Piccaninny Creek @ Minto	-36.64	144.39
	408202	Avoca River @ Amphitheatre	-37.26	143.40

State	Site Number	Site Name	Latitude	Longitude
New South Wales	201001	Oxley River @ Eungella	-28.36	153.19
	201900	Tweed River @ Uki	-28.46	153.25
	203002	Coopers Creek @ Repentance	-28.59	153.39
	203005	Richmond River @ Wiangaree	-28.41	152.90
	203010	Leycester River @ Rock Valley	-28.60	153.13
	203030	Myrtle Creek @ Rappville	-29.10	152.83
	204016	Little Murray River @ North Dorrigo	-30.34	152.60
	204017	Bielsdown Creek @ Dorrigo No.2 & No.3	-30.35	152.70
	204019	Nymboida River @ Bostobrick	-30.31	152.50
	204025	Orara River @ Karangi	-30.29	152.97
	204026	Bobo River @ Bobo Nursery	-30.29	152.85
	204030	Aberfoyle River @ Aberfoyle	-30.20	151.83
	204031	Mann River @ Shannon Vale	-29.92	151.78
	204033	Timbarra River @ Billyrimba	-29.44	152.16
	204034	Henry River @ Newton Boyd	-29.87	152.05
	204036	Cataract Creek @ Sandy Hill (Below Snake Creek)	-29.01	152.13
	204037	Clouds Creek @ Clouds Creek	-30.11	152.57
	204041	Orara River @ Bawden Bridge	-29.98	152.92
	204055	Sportsmans Creek @ Gurranang Siding	-29.38	152.94
	204056	Dandahra Creek @ Gibraltar Range	-29.53	152.36
	205002	Bellinger River @ Thora	-30.46	152.56
	205006	Nambucca River @ Bowraville	-30.61	152.72
	206009	Tia River @ Tia	-31.26	151.76
	206014	Wollomombi River @ Coninside	-30.35	151.93
	206018	Apsley River @ Apsley Falls	-31.00	151.63
	206025	Salisbury Waters Near Dangar Falls	-30.68	151.56
	207006	Forbes River @ Birdwood (Filly Flat)	-31.26	152.32
	207013	Ellenborough River D/S Bunnoo River Junction	-31.55	152.33
	208002	Manning River @ Tomalla (Campbells No.2)	-31.88	151.49
	208005	Nowendoc River @ Rocks Crossing	-31.52	151.94
	208006	Barrington River @ Forbesdale (Causeway)	-31.97	151.61
	208007	Nowendoc River @ Nowendoc	-31.43	151.66
	208008	Gloucester River @ Forbesdale (Faulklands)	-32.08	151.74
	208009	Barnard River @ Barry	-31.59	151.23
	208015	Landsdowne River @ Landsdowne	-31.71	152.46
	209002	Mammy Johnsons River @ Crossing	-32.26	152.05
	209006	Wang Wauk River @ Willina	-32.19	152.20
	210014	Rouchel Brook @ Rouchel Brook (The Vale)	-32.13	151.19
	210017	Moonan Brook @ Moonan 3Brook	-31.98	151.37
	210022	Allyn River @ Halton	-32.19	151.47
	210040	Wybong Creek @ Wybong	-32.05	150.63
	210042	Foy Brook @ Ravensworth	-32.30	151.09
	210048	Wollombi Brook @ Paynes Crossing	-32.96	151.20
	210061	Pages River @ Blandford (Bickham)	-31.75	150.88
	210080	West Brook @ U/S GlendonBrook	-32.43	151.28
	210081	Pages Creek @ U/S Hunter River	-31.70	151.20
	210091	Merriwa River @ Merriwa	-31.98	150.39
	210092	Krui River @ Collaroy	-31.95	150.19
	211008	Jigadee Creek @ Avondale	-33.02	151.48

State	Site Number	Site Name	Latitude	Longitude
New South Wales	211013	Ourimbah Creek @ U/S Weir	-33.30	151.28
	211014	Wyong River @ Yarramalong	-33.14	151.28
	212018	Capertee River @ Glen Davis	-33.04	150.12
	212028	Wolgan River @ Newnes	-33.29	150.18
	215002	Shoalhaven River @ Warri	-35.58	149.66
	215004	Corang River @ Hockeys	-35.24	150.06
	215005	Mongarlowe River @ Marlowe	-35.42	149.94
	215008	Shoalhaven River @ Kadoona	-35.90	149.61
	216004	Currambene Creek @ Falls Creek	-34.99	150.53
	218001	Tuross River @ Tuross Vale	-36.34	149.52
	218002	Tuross River @ Belowra	-36.16	149.57
	218006	Wandella Creek @ Wandella	-36.37	149.78
	218007	Wadbilliga River @ Wadbilliga	-36.29	149.63
	219013	Brogo River @ North Brogo	-36.47	149.62
	219016	Narira River @ Cobargo	-36.39	149.86
	219017	Double Creek Near Brogo	-36.60	149.71
	220002	Stockyard Creek @ Rocky Hall (Whitbys)	-36.96	149.43
	220003	Pambula River @ Lochiel	-36.92	149.76
	220004	Towamba River @ Towamba	-36.99	149.55
	221002	Wallagaraugh River @ Princes Highway	-37.26	149.60
	221003	Genoa River @ Bondi	-37.12	149.31
	222007	Wullwye Creek @ Woolway	-36.33	148.87
	222009	Bombala River @ The Falls	-36.79	149.35
	222010	Bobundara Creek @ Dalgety Road	-36.50	149.09
	222015	Jacobs River @ Jacobs Ladder	-36.64	148.38
	222016	Pinch River @ The Barry Way	-36.71	148.32
	222017	Maclaughlin River @ The Hut	-36.67	149.13
	401008	Mannus Creek @ Tooma	-35.81	147.91
	401009	Maragle Creek @ Maragle	-35.87	148.20
	401013	Jingellic Creek @ Jingellic	-35.78	147.70
	401015	Bowna Creek @ Yambla	-35.90	146.93
	410033	Murrumbidgee River @ Mittagang Crossing	-35.94	148.81
	410038	Adjungbilly Creek @ Darbalara	-35.15	148.44
	410044	Muttama Creek @ Coolac	-34.75	148.06
	410047	Tarcutta Creek @ Old Borambola	-35.46	147.79
	410048	Kyeamba Creek @ Ladysmith	-35.35	147.49
	410057	Goobarragandra River @ Lacmalac	-35.42	148.48
	410061	Adelong Creek @ Batlow Road	-35.44	148.10
	410067	Big Badja River @ Numeralla (Goodwins)	-36.10	149.49
	410071	Brungle Creek @ Red Hill	-35.16	148.32
	410077	Bredbo River @ Laguna	-35.96	149.43
	410096	Mountain Creek @ Thomond North	-35.86	147.27

State	Site Number	Site Name	Latitude	Longitude
New South Wales	410097	Billabong Creek @ Aberfeldy	-35.60	147.53
	410141	Micaligo Creek @ Michelago	-35.73	149.22
	410705	Molonglo River @ Burbong Bridge	-35.47	149.43
	410734	Queanbyan River @ Tinderry	-35.77	149.42
	411003	Butmaroo Creek @ Butmaroo	-35.32	149.54
	412063	Lachlan River @ Gunning	-34.78	149.43
	412066	Abercrombie River @ Hadley No.2	-34.18	149.74
	412076	Bourimbla Creek @ Cudal	-33.32	148.84
	412080	Flyers Creek @ Beneree	-33.44	149.06
	412089	Cooks Vale Creek @ Peelwood	-34.17	149.49
	412092	Coombing Creek @ Near Neville	-33.67	149.29
	412096	Pudmans Creek @ Kennys Creek Road	-34.53	148.88
	416008	Beardy River @ Haystack	-29.35	151.57
	416020	Ottleys Creek @ Coolatai	-29.37	150.79
	416022	Severn River @ Fladbury	-29.68	151.77
	416023	Deepwater River @ Bolivia	-29.40	151.92
	418005	Copes Creek @ Kimberley	-29.96	151.25
	418015	Horton River @ Rider (Killara)	-30.11	150.39
	418017	Myall Creek @ Molroy	-29.75	150.79
	418021	Laura Creek @ Laura	-30.23	151.48
	418025	Halls Creek @ Bingara	-30.02	150.60
	418027	Horton River @ Horton Dam Site	-30.30	150.32
	418032	Tycannah Creek @ Horseshoe Lagoon	-29.87	150.18
	419010	Macdonald River @ Woolbrook	-31.18	151.50
	419029	Halls Creek @ Ukolan	-30.79	150.97
	419035	Goonoo Goonoo Creek @ Timbumburi	-31.41	150.94
	419047	Ironbark Creek @ Woodsreef	-30.33	150.84
	419053	Manilla River @ Black Springs	-30.40	150.51
	419054	Swamp Oak Creek @ Limbri	-31.14	151.33
	420003	Belar Creek @ Warkton (Blackburns)	-31.36	149.12
	420010	Wallumburrawang Creek @ Bearbung	-31.50	149.02
	421018	Bell River @ Newrea	-32.95	148.95
	421026	Turon River @ Sofala	-33.21	149.89
	421048	Little River @ Obley No.2	-32.91	148.53
	421050	Bell River @ Molong	-33.13	149.05
	421055	Coolbaggie Creek @ Rawsonville	-32.01	148.64
	421056	Coolaburragundy River @ Coolah	-31.76	149.83
	421066	Green Valley Creek @ Hill End	-32.99	149.51
	421068	Spicers Creek @ Saxa Crossing	-32.30	149.09
	421076	Bogan River @ Peak Hill No.2	-32.88	148.05
	421084	Burrill Creek @ Mickibri	-32.89	148.32
	421101	Campbells River @ U/S Ben Chifley Dam	-33.76	149.64
	421104	Brisbane Valley Creek @ Stromlo	-33.77	149.77

Appendix B Metadata details

Additional Climate Products

Mean Monthly and Mean Annual Rainfall and Temperature Data

Abstract

Mean monthly and mean annual rainfall and temperature grids. The grids show the raw rainfall values across Australia. The mean data are based on the standard 30-year period 1961-1990. See LINEAGE below for more information.

Metadata

GEOGRAPHIC EXTENT NAME(S):	Australia
BEGINNING DATE:	N/A
ENDING DATE:	N/A
PROGRESS:	Completed
MAINTENANCE AND UPDATE FREQUENCY:	10+ years
STORED DATA FORMAT:	Arc/Info – all Australia
AVAILABLE FORMAT TYPE(S):	ASCII, Arc/Info grid export (all Australia or part thereof)
ACCESS CONSTRAINTS:	Commonwealth of Australia copyright applies (see Copyright Information below)
LINEAGE:	Gridded data were generated using the ANU (Australian National University) 3-D Spline (surface fitting algorithm). As part of the 3-D analysis process a 0.025 degree resolution digital elevation model (DEM) was used. Approximately 6000 rainfall stations were used in the rainfall analyses and 700 stations were used in the temperature analyses. All input station data underwent a high degree of quality control before analysis, and conform to WMO (World Meteorological Organisation) standards for data quality.
POSITIONAL ACCURACY:	Better than 0.02 (approximately 2km) degrees
ATTRIBUTE ACCURACY:	80% of data have an associated quantitative uncertainty of 5%; uncertainty of remainder is within 15%
LOGICAL CONSISTENCY:	N/A
COMPLETENESS:	No missing data
ADDITIONAL METADATA:	Supersedes maps printed in: Climatic Atlas of Australia (Australian Government Printing Service, 1975)
ATTRIBUTES	Grid/s (grid points) provide rainfall and temperature values for all Australia on a grid-cell by grid-cell basis
SCALE/RESOLUTION	0.025 degrees (i.e. based on 0.025 x 0.025 degree gridded data)
SIZE OF DATASETS	Based on areal extent required

Copyright Information

ISBN:
Published: 2001
Format: CD-ROM or FTP
Cost: Please contact us for information
Contact:

Email	webclim@bom.gov.au
Telephone	03 9669 4082
Fax	03 9669 4515
Post	Data Services National Climate Centre GPO Box 1289 K Melbourne, 3001, Australia

Metadata

Dataset	
Title	Mean monthly and mean annual evapotranspiration (base climatological data sets)
Custodian	
Custodian	Bureau of Meteorology
Jurisdiction	Australia
Description	
Abstract	Mean monthly and mean annual areal actual, areal potential and point potential evapotranspiration grids. The grids show evapotranspiration values across Australia in the form of two-dimensional array data. The mean data are based on the standard 30-year period 1961-1990. See LINEAGE below for more information.
Search Word(s)	Gridded, spline, analyses, climatology, evapotranspiration, hydrology, meteorology
Geographic Extent Names(s)	Australia
General Category	Gridded climatological data
General Custodian Jurisdiction	Australian Government Australia
Geographic Extent Polygon	Not applicable
Geographic Bounding Box	See below
North Bounding Latitude	-10.1
South Bounding Latitude	-43.8
East Bounding Longitude	153.85
West Bounding Longitude	112.15
Data Currency	
Beginning Date	1961
Ending Date	1990
Dataset Status	
Progress	Completed
Maintenance and Update frequency	Ongoing
Access	
Stored Data Format	Arc/Info grids – all Australia

Available Format Type	ASCII row major, Arc/Info grid Interchange (.e00), Shapefiles.
Access Constraint	Please note that the copyright for any data supplied by the Bureau of Meteorology is held in the Commonwealth of Australia and the purchaser shall give acknowledgement of the source in reference to the data. Apart from dealings under the Copyright Act 1968, the purchaser shall not reproduce (electronically or otherwise), modify or supply (by sale or otherwise) these data without written permission from the supplier. Please contact us (see details below) for more information.
Data Quality	
Lineage	Gridded data were generated using the ANU (Australian National University) 3-D Spline (surface fitting algorithm). The grid point resolution of the data is 0.1 degrees (approximately 10km). As part of the 3-D analysis process a 0.1 degree resolution digital elevation model (DEM) was used. Approximately 700 stations were used in the analysis, and all input station data underwent a high degree of quality control before analysis, and conform to WMO (World Meteorological Organisation) standards for data quality. Areal Actual ET is the ET that actually takes place, under the condition of existing water supply, from an area so large that the effects of any upwind boundary transitions are negligible and local variations are integrated to an areal average. Areal Potential ET is the ET that would take place, under the condition of unlimited water supply, from an area so large that the effects of any upwind boundary transitions are negligible and local variations are integrated to an areal average. Point Potential ET is the ET that would take place, under the condition of unlimited water supply, from an area so small that the local ET effects do not alter local airmass properties. It is assumed that latent and sensible heat transfers within the height of measurement are through convection only. The above definitions are based on those given by Morton (1983), but we have used the term areal potential ET for Morton's wet-environment ET and the term point potential ET for Morton's potential ET. Morton, F.I. (1983). Operational estimates of areal evapotranspiration and their significance to the science and practice of hydrology. Journal of Hydrology, 66: 1-76.
Positional Accuracy	The observational (station) data on which the analyses were based have an associated accuracy of the order of 0.01 degrees (approximately 1km) or better.
Attribute Accuracy	Grid point data are post processed. For more information please contact us.

Logical Consistency	Not applicable
Completeness	No missing data
Contact Information	
Contact Organisation	Bureau of Meteorology
Contact Position	Information officer
Mail Address	PO BOX 1289K, Melbourne 3001, Australia
Locality	
State	Victoria
Country	Australia
Postcode	3001
Telephone	(03) 9669 4082
Facsimile	(03) 9669 4515
Electronic Mail	webclim@bom.gov.au
Metadata date	
Metadata date	2003
Additional Metadata	Additional information available on request (see contact above).

Resource Identifier: ID03

Title:

EXTENSION OF UNIMPAIRED MONTHLY STREAMFLOW DATA AND REGIONALISATION OF PARAMETER VALUES TO ESTIMATE STREAMFLOW IN UNGAUGED CATCHMENTS (NLWRA 2000) - NLWA Boundaries

Resource creation on 1900-01-01

Abstract:

Digital catchment boundaries for 286 catchments where streamflow was extended.

Further Reading:

Main theme(s) of the product:

geoscientificInformation

EXTENT(S)

Bounding Box:

Include / Exclude North Latitude South Latutude East Longitude West Longitude

Include -9 -44 154 112

Temporal Extent:

Beginning Date: Ending Date:

19010101 19980101

Language(s) used in product:

English

Character sets(s) used in product:

utf8

Resource Access

On-Line resource: TO01_ID03_DF22_RS05_GR00_VR00_DL901 Name: nlwa_boundaries.shp

Description: ESRI Shapefile of Digital catchment boundaries for 286 catchments where streamflow was extended.

Linkage:
http://baldric.brs.gov.au/corporate/public/data/usfe_r9nnd_001/usfe_r9nnd_00111a03es_geo___/nlwa_boundaries.shp

Protocol: directRead

Application profile: VENDOR = ESRI: APPLICATION = OGC

On-Line resource: TO02_ID03_DF22_RS13_GR00_VR00_DL901 Name: NLWA_BOU_CLP

Description: ESRI Shapefile of Digital catchment boundaries for 286 catchments where streamflow was extended.- data for clipping

Linkage:
http://baldric.brs.gov.au/corporate/public/data/usfe_r9nnd_001/usfe_r9nnd_00111a03ec_alb132/NLWA_BOU_CLP

Protocol: clip

Application profile: VENDOR = ESRI: APPLICATION = OGC

On-Line resource: TO03_ID03_DF23_RS05_GR00_VR00_DL901 Name:
usfe_r9nnd_00111a03es_geo___.zip

Description: Winzipped ESRI Shapefile of Digital catchment boundaries for 286 catchments where streamflow was extended.

Linkage:
http://baldric.brs.gov.au/corporate/public/data/usfe_r9nnd_001/usfe_r9nnd_00111a03es_geo___.zip

Protocol: FTP

Application profile: VENDOR = ESRI: APPLICATION = OGC

Additional Information

KEYWORDS

Keyword: WATER Rivers, Monitoring

Type: theme

Thesaurus: Title:

ANZLIC Keywords

Resource revision on 2000-06-01

CONSTRAINTS

RESOURCE LEGAL CONSTRAINTS:

Legal Constraint:

Access Constraint: license

Access Constraint: otherRestrictions

Use Constraint: license

Use Constraint: otherRestrictions

Other Limitations:

Data provided for the sole and exclusive use of authorised individual or agency on a single licence basis. Its use is to be acknowledged in any visual or published materials. The data must not be used for direct commercial gain. Errors or omissions should be made known directly to the data custodian. The Commonwealth does not accept any responsibility or liability for the outcomes of the use of the data. Gauging station site locations and daily records are not available for non-Audit projects

PARTY RESPONSIBLE FOR THE PRODUCT(S) - CONTACT INFORMATION

Custodian

Individual responsible for product: Not Known

Organisation responsible for product: National Land and Water Resources Audit (NLWRA)

Position responsible for product: Technical Director

ADDRESS Delivery point: GPO Box 2182

City: Canberra

State: ACT

Postalcode: 2601

Country: Australia

PHONE NUMBERS Telephone: 02 6257 3067

Fax: 02 6257 9518

EMAIL ADDRESS(ES)atlas@nlwra.gov.au

MAINTENANCE INFORMATION ABOUT THE PRODUCT(S)

Maintanance Information:

Update Frequency: notPlanned

DATA QUALITY

This report relates to a: dataset

Lineage

STATEMENT:

These surfaces were generated using ANUCLIM version 1.8 and an ASCII version of the AUSLIG 9 Second DEM Surfaces have been resampled from 0.0025 degree cell size to 0.01 degree cell size using bilinear interpolation.To convert from floating point grids to integer grids some grids were multiplied by a value of 100.

DATA QUALITY

PRODUCTS FORMATS

Available Format(s)

Information about available product Format: DF22Format: DIGITAL - ESRI ShapeFile

Version: X

Ammendment: X

Compression: None

Information about available product Format: DF23Format: DIGITAL - ESRI ShapeFile

Version: X

Ammendment: X

Compression: Winzip

Stored Format(s)

Information about product Stored Format: Format: DIGITAL - ESRI Shapefile

Version: x

Ammendment: x

Compression: Not Compressed

SPATIAL REFERENCING SYSTEMS

Information about Spatial Referencing System: RS05Reference System Code: -P Unprojected -U Decimal degrees -E World Geodetic System 1984 -D World Geodetic System 1984 -o 0 -e 0 -n 0 -u metres -s 1

Projection: Unprojected -U Decimal degrees

Elipsoid: World Geodetic System 1984

Datum: World Geodetic System 1984

Standard Parallels:

Central Meridian:

UTM Zone:

Latitude of Projection Origin: 0

False Easting: 0

False Northing: 0

False Easting/Northing Units: metres

Scale Factor at projection Centre: 1

Information about Spatial Referencing System: RS13Reference System Code: -P Albers EqualArea Conic -U Metres -E Geodetic Reference System 1980 -D Geocentric Datum of Australia 1994 -p -18 -p -36 -m 132 -o 0 -e 0 -n 0 -u metres -s 1

Projection: Albers EqualArea Conic -U Metres

Elipsoid: Geodetic Reference System 1980

Datum: Geocentric Datum of Australia 1994 -p -18 -p -36 -m 132

Standard Parallels: -18 -p -36

Central Meridian: 132

UTM Zone:

Latitude of Projection Origin: 0

False Easting: 0

False Northing: 0

False Easting/Northing Units: metres

Scale Factor at projection Centre: 1

Information about Spatial Referencing System: RS05Reference System Code: -P Unprojected -U Decimal degrees -E World Geodetic System 1984 -D World Geodetic System 1984 -o 0 -e 0 -n 0 -u metres -s 1

Projection: Unprojected -U Decimal degrees

Elipsoid: World Geodetic System 1984

Datum: World Geodetic System 1984

Standard Parallels:

Central Meridian:

UTM Zone:

Latitude of Projection Origin: 0

False Easting: 0

False Northing: 0

False Easting/Northing Units: metres

Scale Factor at projection Centre: 1

SPATIAL REPRESENTATION

Top

Information about the product DESCRIPTION (metadata)

Language used in description: ENGLISH

Characterset used in description: utf8

Description creation date: 2000-12-28

PARTY(S) RESPONSIBLE FOR THE PRODUCT DESCRIPTION

Custodian

Individual responsible for product: Not Known

Organisation responsible for product: National Land and Water Resources Audit (NLWRA)

Position responsible for product: Technical Director

ADDRESS Delivery point: GPO Box 2182

City: Canberra

State: ACT

Postalcode: 2601

Country: Australia

PHONE NUMBERS Telephone: 02 6257 3067

Fax: 02 6257 9518

EMAIL ADDRESS(ES)atlas@nlwra.gov.au

METADATA LEGAL CONSTRAINTS:

Legal Constraint:

Other Limitations:

Metadata may be redistributed within an organisation (Intranet, Internet, LAN, WAN). In all other cases metadata is not to be distribution via the internet except when sourced from Department of Agriculture, Fisheries and Forestry (DAFF - Australian Government) [harvesting for re-distribution explicitly NOT allowed]. Organisation may redirect users to DAFF distribution point either as direct link to metadata file, or links to ANRDL, or by using the ANRDL Z39.50 service.

Dataset TITLE
GEODATA 9 Second Digital Elevation Model (DEM-9S) Version 3

Dataset AUTHOR(S)
M. F. Hutchinson
J. A. Stein
J. L. Stein

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
The GEODATA 9 Second DEM Version 3 is a gridded digital elevation model computed, using the ANUDEM elevation gridding program Version 5.2.2, from continent-wide topographic data including point elevations, streamlines, water body boundaries and cliff lines. The grid spacing is 9 seconds in longitude and latitude (approximately 250 metres). The 9 Second DEM is a cooperative effort of the Fenner School of Environment and Society of the Australian National University and Geoscience Australia.

Description SEARCH WORD(S)
LAND Topography

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
AUSTRALIA EXCLUDING EXTERNAL TERRITORIES: AUS

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -9
S_LAT: -44
E_LONG: 154
W_LONG: 112

Description GEOGRAPHIC EXTENT POLYGON(S)
112 -9, 154 -9, 154 -44, 112 -44, 112 -9

Data Currency BEGINNING DATE
01JUL2005

Data Currency ENDING DATE
30JUN2008

Dataset Status PROGRESS
Complete

Dataset Status MAINTENANCE AND UPDATE FREQUENCY
Not Known

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-grid ArcInfo grid Geographic GDA94 GRS80
DIGITAL	asc ASCII text Geographic GDA94 GRS80
DIGITAL	ers ER Mapper raster dataset Geographic GDA94 GRS80
DIGITAL	img ERDAS Imagine image Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-grid ArcInfo grid Geographic GDA94 GRS80
DIGITAL	asc ASCII text Geographic GDA94 GRS80
DIGITAL	ers ER Mapper raster dataset Geographic GDA94 GRS80
DIGITAL	img ERDAS Imagine image Geographic GDA94 GRS80

Access ACCESS CONSTRAINT

Data Quality LINEAGE

Source data used to create the GEODATA 9 Second DEM Version 3 consisted of the following datasets.

1. A total of 5.2 million spot heights from the GEODATA TOPO-250K Relief theme, Version 1.
2. A total of 2.0 million watercourse features from the drainage layer of the GEODATA TOPO-250K Hydrography theme, Version 1.
3. A total of 25,000 cliff lines from the morphology layer of the GEODATA TOPO-250K Relief theme, Version 2.
4. A total of 19,000 trigonometric data points from the National Geodetic Database.
5. Coastline data from GEODATA COAST 100K data and coastal inlets from the GEODATA TOPO-250K Framework layer.
6. Lakes from the waterbody layer of the GEODATA TOPO-250K Hydrography theme, Version 1.
7. Reservoirs from the waterbody layer of the GEODATA TOPO-250K Hydrography theme, Version 1 for Tasmania and Version 2 for the mainland.
8. Radar altimeter point elevation data supplied by Geoscience Australia for Lake Eyre.
9. A total of 326,000 spot heights digitised by ANU Fenner School from 1:100K scale topographic mapping.
10. A total of 90,000 stream arcs digitised by ANU Fenner School from 1:100K scale topographic mapping.
11. A total of 25,000 sink data points digitised by NU Fenner School from 1:100K scale topotraphic mapping.
12. A total of 4,000 coastline cliffs selected from the GEODATA COAST 100K data.
13. Selected contour lines and cliff lines digitised by ANU Fenner School from 1:100K scale topographic maping.

All data revisions were performed by the Australian National University Fenner School. These included, for Version 3, a total of 12,000 corrections to spot heights from teh GEODATA TOPO-250K Relief theme and 7,000 corrections to stream data from the GEODATA 250K Hyrdrography theme. Streamline corrections were make to orient all streams in the direction of flow. All canals were removed from the streamline data except where they were needed to assist in defining drainage structure. All points on tops of sand dunes were removed.

The DEM was calculated by ANUDEM Version 5.2.2 in overlapping tiles across Australia. The tiles corresponded apprximately to the standard 1:1M map sheet areas but with an adjoining margin of 0.1 degree (approximately 10 kms). The overlapping grid tiles were blended together using the ARC/INFO mosaic command.

ANUDEM Version 5.2.2 had the following improvements.

1. Improved automated drainage enforcement algorithm.
2. Improved representation of streamlines and cliff lines.
3. Incorporation of stream distributaries.
4. Minimisation of spurious interactions between streamlines and cliff lines and between closely separated cliff lines.

5. Improved location and representation of coastlines permitting a smooth transition to the sea floor in the absence of coastal cliffs.
6. Improved representation of lakes.

The drainage enforcement algorithm within ANUDEM was applied to the whole continent. Errors in source point and streamline data were mainly detected by examining diagnostics output by ANUDEM. These consisted of remaining spurious sinks, large residuals from point data and stream and cliff error diagnostics. Grids were finally checked by Geoscience Australia against Version 2 of teh 9 second DEM and 1:100K scale topographic mapping. If elevation or stream errors were found then corrections were made and the grid was re-calculated.

Data Quality POSITIONAL ACCURACY
The density of the source data and the 9 second grid spacing means that the grid can be considered to have a scale of 1:250 000. The notion of positional accuracy for the longitude and latitude values given in the data is not applicable as the grid locations are generated as part of the grid generation process.

Data Quality ATTRIBUTE ACCURACY
The elevation given for each cell is an estimate of the elevation at the centre of the area covered by the cell. The accuracy of the elevation values can be considered as being continuously variable across the DEM, with local relief around each DEM cell, as defined by its four closest neighbours, having the greatest influence.

Estimates based on residuals from points selected from 1:25K scale contour elevation data, which were not used to calculate the DEM, indicate that 50% of the 9 second DEM has local relief not exceeding 4 metres and corresponding standard elevation error not exceeding about 10 metres. A further 30% of the DEM has local relief not exceeding 13 metres and a standard error not exceeding about 15 metres. A further 15% of the DEM has local relief not exceeding 56 metres and a standard elevation error not exceeding about 35 metres. A further 4% of the DEM has local relief not exceeding 140 metres and standard error not exceeding 50 metres. For the remaining 1% of the DEM, local relief is essentially less than about 250 metres and standard elevation error does not exceed about 60 metres.

Maximum errors are naturally greater than standard elevation errors. They range from around 20 - 40 metres in low relief areas up to around 200 - 300 metres in complex high relief areas associated with cliffs. Not all significant peaks have been included in the source data for the DEM. It shoulld therefore be used with care in line of sight applications that depend critically on the accuracy of representation of peaks.

Comparisons with 19,000 trigonometric data points from the National Geodetic Database, which were included in the source data for the DEM, confirmed a root mean residual of 12 metres at principal high points across the continent and an overall maximum error of about 200 metres.

The mean distance of the gridded stream lines, as incorporated in the 9 second DEM Version 3, from the GEODATA 250K streamline network is about 60 metres or one quarter of the width of one grid cell. Approximately 95% of the gridded streamlines lie within 125 metres of the mapped streamline network and virtually all are within 270 metres.

Data Quality LOGICAL CONSISTENCY
The DEM supplies one elevation value for each grid cell. Each value denotes an estimate of the elevation of the mid-point of the cell. The heights of each cell and its eight immediate neighbours are such that elevations decrease in the direction of flow along all supplied data streamlines, including all supplied data stream distributaries. The elevation at each supplied sink point is a local minimum of the elevation grid.

Data Quality COMPLETENESS
The DEM covers all land areas including all islands defined by the GEODATA COAST 100K data. The source data include all corrected GEODATA TOPO-250K Version 1 spot heights, GEODATA TOPO-250K Version 1 streamlines and GEODATA TOPO-250K Version 2 cliff lines. The source data also includes all corrected trigometric points but does not include all mapped peaks at the 1:100K scale.

Contact Information CONTACT ORGANISATION
Geoscience Australia

Contact Information CONTACT POSITION
Director, Sales and Distribution, ISB

Contact Information MAIL ADDRESS 1
GPO Box 378

Contact Information MAIL ADDRESS 2

Contact Information SUBURB/PLACE/LOCALITY
Canberra

Contact Information STATE/LOCALITY 2
ACT

Contact Information COUNTRY
Australia

Contact Information POSTCODE
2601

Contact Information TELEPHONE
+61 2 6249 9966

Contact Information FACSIMILE
+61 2 6249 9960

Contact Information ELECTRONIC MAIL ADDRESS
sales@ga.gov.au

Metadata Date METADATA DATE
31DEC2007

Additional Metadata ADDITIONAL METADATA
A national regular grid digital elevation model (DEM) of Australia with a grid spacing of 9 seconds in longitude and latitude (approx. 250m).

The DEM has a nominal scale of 1:25K and can be used for national, statewide and regional appications, particularly those that depend on an accurate respresentation of surface drainage and catchment structure.

The DEM was calculated by the ANUDEM elevation gridding program Version 5.2.2 as developed by the Australian National University Fenner School of Environment and Society.

The source data included 5.2 million point elevations, 2.0 million streamlines and 25,000 cliff lines from the GEODATA TOPO-250K data layers and 19,000 trigonometric points from the National Geodetic Database.

These source data were supplied by Geoscience Australia and were comprehensively revised by the ANU Fenner School.

The Fenner School also digitised an additional 326,000 spot heights, 90,000 streamlines, 25,000 sink points and 1,000 cliff lines from 1:100K scale mapping to improve the elevation and drainage accuracy of the DEM across the continent. The additional sink point data also permitted application of the drainage enforcement algorithm of the ANUDEM program across the entire continent. Coastline data were selected from GEODATA COAST-100K data and the GEODATA TOPO-250K framework layer. Streamines and cliff lines were incorporated to better represent shape and drainage structure. The ANUDEM program was revised to improve the representation of streamlines, cliff lines, lake boundaries and the coastline.

The program was also revised to systematically represent streamline distributaries, and to minimise spurious interactions between cliffs and streamines and between closely separated cliff lines.

It was also revised to provide improved diagnostics to identify a wide range of errors in all source data. All errors detected in the source data were corrected. Final DEM quality checking was performed by Geoscience Australia in consultation with the ANU Fenner School.

For further Information, refer to the GEODATA 9 Second DEM Version 3 and Flow Direction Grid User Guide (UserGuide.pdf), supplied with the product or available on www.ga.gov.au

For further information on the ANUDEM program Version 5.2.2 used to calculate the DEM please contact the Fenner School of Environment and Society:
Fenner School Publications/Software
Fenner School of Environment and Society
Australian National University
CANBERRA ACT 0200
e-mail: publications@fennerschool.anu.edu.au
Internet: http://fennerschool.anu.edu.au/publications/software/

End of file ...

GEODATA TOPO 250K Series 3 Topographic Data

- Citation
- Description
- Data currency
- Dataset status
- Access
- Data quality
- Contact information
- Metadata information
- Additional Metadata

Note: This metadata describes the dataset in accordance with the ANZLIC (Australia New Zealand Land Information Council) Core Metadata Guidelines Version 2.

[]

DATASET CITATION

ANZLIC unique identifier: ANZCW0703005458
Title: GEODATA TOPO 250K Series 3 Topographic Data

[]

CUSTODIAN

Custodian: Geoscience Australia
Jurisdiction: Australia

[]

DESCRIPTION

Abstract:
Series 3 contains a medium scale vector representation of the topography of Australia. The data include the following ten themes and 92 feature classes:
Cartography:
Annotations, CartographicLines, CartographicPoints, GraticuleAnnotations, Graticules, GridAnnotations and Grids
Elevation: Contours, BenchMarks, HorizontalControlPoints and SpotElevations
Framework: ProhibitedAreas, Reserves, FrameworkBoundaries, Islands, LargeAreaFeatures, Locations, Mainlands, Seas, GeodataIndexes and MapIndexes
Habitation: BuildingAreas, BuildingPoints, BuiltUpAreas, CemeteryAreas, CemeteryPoints, Homesteads, PlaceNames, PopulatedPlaces and RecreationAreas
Hydrography: CanalLines, Locks, RapidLines, Spillways, WatercourseLines, WaterfallPoints, Bores, CanalAreas, Flats, Lakes, PondageAreas, RapidAreas, Reservoirs, Springs, WatercourseAreas, Waterholes, WaterPoints, MarineHazardAreas, MarineHazardPoints and ForeshoreFlats
Infrastructure: AerialCableways, DamWalls, Fences, MarineInfrastructureLines, MarineInfrastructurePoints, VerticalObstructions, WaterTanks, Yards, Conveyors, MineAreas, MinePoints, PetroleumWells and StorageTanks
Terrain: Caves, Craters, DeformationAreas, Discontinuities, Pinnacles, SandRidges and Sands
Transport: AircraftFacilityPoints, RailwayBridgePoints, RailwayCrossingLines, Railways, RailwayStopPoints, RailwayTunnelLines, RailwayTunnelPoints, BarrierPoints, FerryRouteLines, FootTracks, RoadCrossingLines, RoadCrossingPoints, Roads, RoadTunnelLines and RoadTunnelPoints
Utility: Pipelines and Powerlines
Vegetation: ClearedLines, CultivatedAreas, NativeVegetationAreas and Windbreaks
ANZLIC SEARCH WORDS:

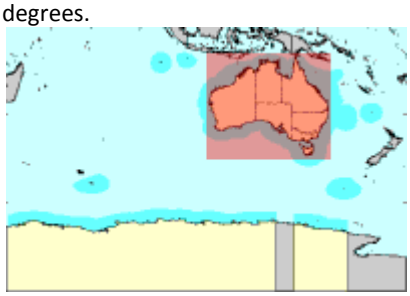
BOUNDARIES Mapping
ENERGY Mapping
FORESTS Mapping
HERITAGE Natural Mapping
HUMAN ENVIRONMENT Mapping
LAND Mapping
MARINE Mapping
TRANSPORTATION Mapping
UTILITIES Mapping
VEGETATION Mapping
WATER Mapping

SPATIAL DOMAIN - In a Geodatabase environment the spatial domain is set as:

Minimum X: 108.000000
Minimum Y: -48.000000
Maximum X: 21582.83645
Maximum Y: 21426.83645

Precision: 100000.000000

The precision of the NTDB is 0.00001 degrees, which equates to approximately 1 metre on the ground. This value is determined by dividing 1 coordinate system unit (degree) by the scale of the data. 1 degree / 100000 = 0.00001 degrees.



GEOGRAPHIC EXTENT NAME: AUSTRALIA EXCLUDING EXTERNAL TERRITORIES - AUS - Australia - Australia
Note: The format for each Geographic extent name is: Name - Identifier - Category - Jurisdiction (as appropriate) See GEN Register

GEOGRAPHIC BOUNDING BOX:

North bounding latitude: -8.9°
South bounding latitude: -44°
East bounding longitude: 154.1°
West bounding longitude: 112.8°

[]

DATA CURRENCY

Beginning date: 9/05/06
Ending date: Current

[]

DATASET STATUS

Progress: 9/05/06
Maintenance and update frequency: Irregular

[]

ACCESS

Stored data format:

DIGITAL - Personal Geodatabase (pgdb) Geographic GDA94
DIGITAL - MapInfo file format (.tab), MapInfo Geographic GDA94
DIGITAL - ArcView shape file (.shp) Geographic GDA94

Available format type:

DIGITAL - Personal Geodatabase (pgdb) Geographic GDA94
DIGITAL - MapInfo file format (.tab), MapInfo Geographic GDA94
DIGITAL - ArcView shape file (.shp) Geographic GDA94

Access constraints:

The data are subject to Commonwealth of Australia Copyright. A licence agreement is required and a licence fee is also applicable for packaged data (included in the purchase price). Geodata TOPO250K Series 3 replace Series 1 and 2.
Download or Order Product

[]

DATA QUALITY

Lineage:

GEODATA TOPO 250K Series 3 is primarily sourced from *GEODATA TOPO 250K Series 2* and 1:250 000 scale map reproduction material (from the National Topographic Map Series and Defence Joint Operation Graphics). A key revision source for the data is satellite imagery taken from the SPOT Panchromatic and LANDSAT Thematic Mapper Sensors. Revision material has also been gathered from a variety of authoritative sources. More information about the sources for this data can be found in Geoscience Australia's Topographic Data and Map Specifications.

Positional accuracy:

Geoscience Australia has carried out both error budget analysis and limited field tests to verify the positional accuracy of the data. *GEODATA TOPO 250K Series 3* data complies with the following statement of horizontal accuracy: "The summation of errors from all sources results in data with a standard deviation of 85 metres for well defined features". Alternative and equal ways of expressing this error are: Not more than 10% of well-defined points

are in error by more than 140 metres; and, in the worst case, a well defined point is out of position by 300 metres. As the *GEODATA TOPO 250K Series 3* data were digitised from existing map production material, some features may be subject to cartographic displacement.
Vertical Accuracy: The accuracy of the spot elevations in the relief layer varies with the type of source material from which they were captured and the point determination for each particular point. Most spot heights have an accuracy of + or - 5 metres, however bench marks and horizontal control points have an accuracy of + or - 1 metre. The accuracy of contours is defined as 1/2 of the contour interval, for example + or - 25 metres for a 50 metre contour interval.
Attribute accuracy:
For the TOPO 250K product, attribute accuracy is a measure of the degree to which the attribute values of features agree with the information on the source material. The allowable error in attribute accuracy ranges from 0.5% to 5%, at a 99% confidence level. Where less than 1% of attribute errors are permissible the entire population is tested. Where a less stringent limit is set for allowable errors a random subset of the relevant features in the tile is generally tested. The sample size is determined from statistical tables using the known population size of the relevant feature. Further information on the validation and testing methodology used by Geoscience Australia can be found in Appendix J of the Topographic Data and Map Specifications.
Logical Consistency:
Validating logical consistency may involve tests to check that table and file names are set out as in the Data Dictionary. Also included are graphical tests which check such things as intersections, polygon closure, minimum sizes of polygons and topological relationships. The allowable error in logical consistency ranges from 0% to 5%. Further information on the validation and testing methodology used by Geoscience Australia can be found in Appendix J of the Topographic Data and Map Specifications.
Completeness:
All instances of a feature and its attribute values that appear on the source material are captured unless otherwise indicated in the selection criteria for that feature.

[]

CONTACT INFORMATION

Contact organisation: Geoscience Australia (GA)
Contact position: Director, Sales and Distribution, CIMA
Mail address: GPO Box 378
Locality: Canberra
State: ACT
Country: Australia
Postcode: 2601
Freecall (within Australia):1800 800 173
Telephone: +61 2 6249 9966
Facsimile: +61 2 6249 9960
Electronic mail address: sales@ga.gov.au

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METADATA INFORMATION

Metadata date: 2006-06-13

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ADDITIONAL METADATA

Metadata reference XHTML: http://www.ga.gov.au:88/newintranet/meta/ANZCW0703005458.html
Metadata reference XML:http://www.ga.gov.au:88/newintranet/meta/ANZCW0703005458.xml
Scale/resolution: 1:250 000
Projection/datum:
- Datum: GDA94
- Projection: Geographical - latitude and longitude

Forest Extent and Change (v4)

Area Corrected Aggregate Products

Custodian
Department of Climate Change

Publication Date
September 2008

Abstract
Landsat satellite imagery was used to discriminate between forest and non-forest cover.
A forest is defined as vegetation with a minimum 20 per cent canopy cover, potentially reaching 2 metres high and a minimum area of 0.2 hectares.

Available epochs are: 1972 1977 1980 1985 1988 1989 1991 1992 1995 1998 2000 2002 2004 2005 & 2006.

Forest change over each transition period is derived by differencing the forest cover in consecutive epochs and then applying specific policy parameters. The aim is to identify areas of land use change relevant to our international carbon accounting obligations.

See National Carbon Accounting System (NCAS) technical Report No. 9 "Land Cover Change: Specifications for Remote Sensing Analysis" for details of the analytical methodology. www.climatechange.gov.au\ncas\reports\tech09.html

The original presence / absence data for each set are assigned an area, in square meters, using the Equal Area Spatial Index (EASI) grid. These areas are summed during aggregation to the output resolution raster product.

Date Range
28 July 1972 - 17 October 2006

Maintenance and update frequency
Each update of the National Carbon Accounting System results in a new suite of products from the entire time series. Changes are also undertaken due to the implementation of a Continuous Improvement and Verification Programme.

Access constraint
Restricted – for approved projects only

Conditions of use
The data were designed primarily for the purpose of providing an analysis of land cover change for reporting via international carbon accounting mechanisms. Use for other purposes should consider the appropriateness of the data.

Lineage
Forest extent is mapped across Australia at a 25-metre resolution from Landsat MSS, TM and ETM+ imagery. Change layers are derived by differencing the extents over consecutive measurements. Areas where detected change is not human-induced are excluded. These areas consist of: tenures where forests are protected; fire affected lands; and other areas as delineated by remote sensing analysts. All products are converted to Geographic projection for continental analysis.

Each 0.00025 degree pixel is then given an area in square metres (methodology available on request). No-data values are attributed as having an area of 0 square metres so as not to contribute to, nor detract from, the area assessment. These data were then aggregated to create grids with resolutions of 0.001, 0.025 and 0.01 degrees. The resultant value attribute contains the sum of the area of the component 0.00025 degree cells, in square metres.

Cell Size(s)
0.001 degrees (~1Ha); or
0.025 degrees (~250m); or
0.01 degrees (~1Km)

Projection
Geographic Decimal Degrees; Datum: GDA 1994

Positional accuracy
The positional accuracy of these data is assumed to be around 10m based on an assessment of the underlying registration base imagery.

Geographic Completeness
Continental coverage is available for all epochs since 2000. The acquisition of Landsat imagery for prior years focused on areas of maximum landuse change. Maps of the spatial extents are published in the technical report referred to in the abstract.

Attribute Completeness
Forest extent is only attributed as present where certainty levels are high, thus eliminating any possibility of false change records. The statistical probability of a forest being confidently attributed as present requires 2 subsequent epochs to be present in the analysis. Therefore, the latest epoch in the analysis is a conservative (interim) estimate of forest extent.

The value attribute is expressed in square metres, and varies with each decimal degree of latitude. All real numbers were rounded to the nearest square centimeter.

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Soil Hydrological Properties of Australia

Prepared by
Andrew Western and Neil McKenzie
CRC for Catchment Hydrology

www.toolkit.net.au/shpa

USER GUIDE

catchment MODELLINGTOOLKIT
supported by the CRC for Catchment Hydrology

COOPERATIVE RESEARCH CENTRE FOR CATCHMENT HYDROLOGY

Document History

Date	Author	Revision	Description of Change
8 Jul 2004	Andrew Western	1.0.0b	First Release
13 August	Andrew Western	1.0.0	Final release for version 1.0

Copyright notice

Legal Information

Acknowledgements

These data are derived from The Digital Atlas of Australian Soils (Bureau of Rural Sciences data set) and Dr Neil McKenzie's interpretations of soil properties for the Atlas. Data were collated by Andrew Western.

Soil Hydrological Properties for Australia

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1 ANZLIC metadata

1.1 Dataset citation

ANZLIC Identifier:

Title: Soil Hydrological Properties for Australia

1.2 Custodian

Custodian: The University of Melbourne

Jurisdiction: Victoria

1.3 Description

Abstract:

This data set provides soil hydrologic properties for A and B horizons derived from soil mapping, a database of typical soil properties and pedotransfer functions. The mapping is based on the Atlas of Australian Soils. Soil properties provided include solum depth, solum plant available water holding capacity, A horizon thickness, A horizon saturated hydraulic conductivity (ksat), A horizon ksat uncertainty estimate, A horizon porosity, A horizon field capacity, A horizon wilting point, A horizon plant available water holding capacity, proportion of area with a B horizon, and the same properties for the B horizon as provided for the A horizon.

ANZLIC Search words:

- SOIL
- SOIL physics

Geographic extent name:

AUSTRALIA EXCLUDING EXTERNAL TERRITORIES – AUS – Australia – Australia

Geographic Bounding Box:

North Bounding Latitude: -10

South Bounding Latitude: -44

East Bounding Longitude: 154

West Bounding Longitude: 112

1.4 Data Currency

Starting Date: Not known

Ending Date: Not known

1.5 Dataset Status

Progress: Complete

Maintenance and update frequency: Not planned

1.6 Access

Stored Data Format:

DIGITAL Map data are stored in ESRI ARCInfo Integer ASCII Grid format. An associated dbf file contains soil properties coded to the map soil landscape type.

Available Data Format:

DIGITAL Map data are stored in ESRI ARCInfo Integer ASCII Grid format. An associated dbf file contains soil properties coded to the map soil landscape type

Access Constraint:

These data are freely available for use under licence from the custodian.

1.7 Data Quality

Lineage:

Source data for this data set include the Digital Atlas of Australian Soils from the Bureau of Rural Sciences and estimates of soil properties from McKenzie, N.J., Jacquier, D.W., Ashton, L.J. and Cresswell, H.P., 2000, Estimation of soil properties using the Atlas of Australian Soils, Technical Report 11/00, CSIRO Land and Water, Canberra.

Positional Accuracy:

The predictive surface is a 0.01 X 0.01 degree grid (geographic coordinate system) or 1 X 1 km (Map Grid of Australia projections). The mapping is derived from a 1:2,000,000 scale representation of polygons originally mapped at 1:250,000 and 1:500,000 scales. Mapping detail varied between regions.

Attribute Accuracy:

The attribute accuracy is highly variable. Information on the level of data support and reliability is provided with the estimates. The number of data points used to estimate properties for specific soil types is quite variable and often low. Area weighted averaging was required to transfer McKenzie et al's (2000) estimates of soil properties for specific soil types (principle profile forms) to estimates for mapped soil landscapes. These resulting estimates provide a regional scale pattern of variation and should not be used for small scale applications or where high attribute accuracy is required.

Logical Consistency:

The data is logically consistent in that each value in the map relates to a single value in the property database.

Completeness:

The data is more than 99% complete.

1.8 Contact Information

Contact Organisation: Department of Civil and Environmental Engineering, The University of Melbourne

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1.9 Metadata Information

Metadata Date: 7 July 2004

1.10 Additional Metadata

A more detailed user guide is part of this data set.

McKenzie et al. (2000) (available from http://www.clw.csiro.au/publications/technical2000/) describe the development of estimates of the properties of principle profile forms and the common principle profile forms found in each soil landscape represented in the Atlas of Australian Soils.

The Digital Atlas of Australian Soil (Bureau of Rural Sciences after Commonwealth Scientific and Industrial Research Organisation, 1991) is described in the meta data for that product (available from http://www.brs.gov.au/data/datasets)

2 User Guide

2.1 Conditions of Data Use

Access constraints: These data are freely available for use under licence from the custodian. The data can be obtained from the Cooperative Research Centre for Catchment Hydrology toolkit website (www.toolkit.net.au).

Full licensing information is detailed at the Download Data link at www.toolkit.net.au/shpa.

2.2 User Support/Contact Information

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2.3 Principal collector(s)

The Atlas of Australian Soils was compiled by K.H. Northcote and colleagues of the CSIRO Division of Soils. It was digitised by the Bureau of Rural Sciences. Estimates of soil hydrologic properties were made by N. McKenzie et al. of CSIRO Land and Water. These two data sets were collated and combined by A. Western, University of Melbourne.

2.4 Custodian/Owner

The Department of Civil and Environmental Engineering, The University of Melbourne is the data custodian. Intellectual property in this data set is owned by the Bureau of Rural Sciences and CSIRO Land and Water.

2.5 About The Dataset

2.5.1 Data theme

The main theme of this data set is other (soil properties).

2.5.2 Coordinate System

Raster maps in ArcInfo ASCII grid format are available in two projection systems.

1 Map Grid of Australia 1994, which is a Universal Transverse Mercator projection aligned to the Geocentric Datum of Australia 1994, with eight zones covering continental Australia. Rasters are available for each map zone at a 1km resolution. The files follow the naming convention aas_zXX.asc, where XX is the zone number. Map Grid of Australia is a Universal Transverse Mercator projection with Central Meridian dependent on the zone, a False Easting of 500,000m, a False Northing of 10,000,000m and a Scale Factor of 0.9996. The datum is the Geocentrci Datum of Australia, 1994.

2 Geographic coordinates or unprojected (i.e. latitude and longitude) at a resolution of 0.01° (~1.1km) and related to the Geocentric Datum of Australia 1994.

2.5.3 Dataset Description

This data set provides soil hydrologic properties for A and B horizons derived from soil mapping, a database of typical soil properties and pedotransfer functions. The mapping is based on the Atlas of Australian Soils. Soil properties provided include solum depth, solum plant available water holding capacity, A horizon thickness, A horizon saturated hydraulic conductivity (ksat), A horizon ksat uncertainty estimate, A horizon porosity, A horizon field capacity, A horizon wilting point, A horizon plant available water holding capacity, proportion of area with a B horizon, and the same properties for the B horizon as provided for the A horizon.

Soil hydrological properties are often required for hydrological modelling, either directly or as the basis for regionalisation. This data set provides a reconnaissance scale national soils map attributed with hydrological properties developed by McKenzie et al. (2000). The data are provided as a digital map of soil landscapes with an associated attribute table that provides the hydrological property estimates for each landscape. Versions are provided using both geographic coordinates (Geocentric Datum of Australia, 1994) and for each Map Grid of Australia 1994 zone. The mapping is based on the Digital Atlas of Australian Soils and the attributes are based on the averages derived from McKenzie et al (2000). This data set is provided in a format that should be easily used with CRCCH toolkit products where required. It is most appropriate for broad-scale analysis where more detailed local soil information is unavailable or where a consistent data set is required nationally. For local analyses, more detailed locally available data (e.g., at a cartographic scale of 1:100,000 or more detailed) should be used. The national coverage compliments other continental-scale datasets (e.g. from the National Land and Water Resources Audit) by providing a synoptic view, along with predictions of basic properties controlling water storage (porosity, field capacity, and wilting point) and permeability. Uncertainty information is also provided.

Data Sources

The datasets used as the basis for these maps were obtained from the Bureau of Rural Sciences (the Digital Atlas of Australian Soils) and CSIRO Land and Water (McKenzie et al., 2000).

The Digital Atlas of Australian Soils (the 'Digital Atlas') is a digital version of the original 'Atlas of Australian Soils'. This consisted of a set of ten maps with accompanying reports (Northcote et al. 1960 – 68). The original maps, depicting soil-landscapes and dominant soil types, were published at a cartographic scale of 1:2,000,000 although base mapping was at a more detailed scale. The Digital Atlas was created by the National Resource Information Centre (NRIC) in 1991 and consists of digitised polygons, along with a variety of attributes, including an electronic version of the explanatory notes. The details of the digitisation process are provided in the metadata and these are available from http://www.brs.gov.au/data/datasets.

McKenzie et al. (2000) used a range of sources, including the CSIRO national soils data base, to provide a set of interpretations of the Digital Atlas to augment the soil descriptions that had been expressed only as soils types classified according to the scheme of Northcote (1979). The interpretations were presented using a two-layer soil model (effectively surface soil and subsoil) and included a variety of attributes relating to soil structure, permeability, nutrition, and texture. Some of these attributes were used as inputs to a pedotransfer function produced by Williams (1992) to develop estimates of water retention properties.

The Digital Atlas needs to be used with care for a range of reasons (see below). Most notable is the absence of explicit statements on the area occupied within each polygon by the component soil types. This prevents the calculation of reliable area-weighted averages. McKenzie et al. (2000) rectified this to some extent by listing the five most common soil types within each map unit. This information can be used to gain a general idea of within-unit variability, and to calculate 'average' values.

The Digital Atlas and interpretation tables provided by McKenzie et al. (2000) are mature products that are not expected to be subject to modification. They are being superceded by new releases of the Australian Soil Resource Information System (see below).

Data collation methodology

There are two parts to the data collation. The first is to convert the polygon data in the Digital Atlas to a raster format. This was performed by converting (if required) the polygons to the desired projection, and then converting the polygons to raster maps. Two projections are available. The first is the Map Grid of Australia 1994, which is a Universal Transverse Mercator projection, with eight zones covering continental Australia. Rasters are available for each map zone at a 1km resolution. The second is unprojected (i.e. latitude and longitude) at a resolution of 0.01° (~1.1km). Both of these formats are related to the Geodetic Datum of Australia 1994 and a datum shift from the Australia Geodetic Datum 1966 was performed.

The second part of the collation was to convert McKenzie et al's (2000) interpretations of soil types and properties so that the hydraulic properties referred directly to the soil landscapes. The original hydraulic properties were associated with Northcote (1979) Principle Profile Forms (PPFs) and between one and five PPFs were associated with each soil landscape. While the proportion of each soil landscape represented by the listed PPFs is not specified, they are ordered in importance from highest to lowest. The weighted averages of the soil hydraulic properties were calculated using the weights in Table 1, which follows the approach used by (McKenzie et al., 2003)

An effort was made to carry the uncertainty information provided in the original interpretations through to the final table of properties. One additional source of uncertainty in this process relates how well Table 1 captures the relative proportions of each PPF and also how many other PPFs may be present in the soil landscape. This has not been quantified. The averaging of hydraulic properties and uncertainty information is discussed in more detail where required for each specific field below.

Table 2-1: Weights applied to each PPF when averaging the hydraulic properties of each landscape.

Number of PPFs	Proportions

	PPF1	PPF2	PPF3	PPF4	PPF5
1	1	0	0	0	0
2	0.6	0.4	0	0	0
3	0.6	0.3	0.1	0	0
4	0.5	0.25	0.15	0.1	0
5	0.4	0.3	0.15	0.1	0.05

2.5.4 Spatial relevance

Geographic Extent Name	
GEN Category	Australia
GEN Custodial Jurisdiction	Australia
GEN Name	Australia excluding external territories
Geographic Bounding Box	
North Bounding Latitude	-10
South Bounding Latitude	-44
East Bounding Longitude	154
West Bounding Longitude	112

Raster maps provided in the Map grid of Australia projection allow for a 1º overlap between zones i.e. they have longitude ranges given by the central meridian ±3.5º.

2.5.5 Time frame

Starting Date Not known

Ending Date Not known

2.5.6 Representativeness

These data are representative of regional scale patterns of soil properties across Australia.

Logical Consistency: The data is logically consistent in that each value in the map relates to a single value in the property database.

Completeness: The data is more than 99% complete.

2.5.7 Accuracy/uncertainty

Positional Accuracy: The predictive surface is a 0.01 X 0.01 degree grid (geographic coordinate system) or 1 X 1 km (Map Grid of Australia projections). The mapping is derived from a 1:2,000,000 scale representation of polygons originally mapped at 1:250,000 and 1:500,000 scales. Mapping detail varied between regions.

Attribute Accuracy: The attribute accuracy is highly variable. Information on the level of data support and reliability is provided with the estimates. The number of data points used to estimate properties for specific soil types is quite variable and often low. Area weighted averaging was required to transfer McKenzie et al's (2000) estimates of soil properties for specific soil types (principle profile forms) to estimates for mapped soil landscapes. These

resulting estimates provide a regional scale pattern of variation and should not be used for small scale applications or where high attribute accuracy is required.

2.5.8 Key limitations

The limitations and uncertainties of these data stem from three areas: the Atlas of Australian Soils, the interpretation of the properties of individual PPFs and the link between the mapped soil landscapes and PPFs. Some of the more significant issues are as follows.

- Reconnaissance scale soil-landscape maps usually have a low predictive capability for individual soil properties (Beckett and Webster 1971). This predictive capability is further diminished by the uncertainty associated with each interpretation.
- The quality of the Atlas mapping varies substantially and an indication of reliability is provided with the original explanatory notes published during the 1960's (Northcote et al. 1960-68). These should be referred to when drawing conclusions about a particular region.
- As noted earlier, a major restriction of the Atlas is the lack of information on the area within each polygon occupied by the component soil types – area-weighted averages cannot be calculated. While a dominant soil type can be specified for each unit, it may occupy a very limited area within a given unit (perhaps 20%). Any analysis based on an interpretation of the dominant soil is therefore of restricted value. An alternative is to calculate average values for the most common soils. However, an average value can be also misleading when there is a clear dominant soil and the minor soils have sharply contrasting properties.
- Very large variation within each map unit is normal. As noted earlier, some units have up to 20 soils listed. It is common for the within-unit variation to be as great as the between-unit variation. This is an inescapable problem with reconnaissance scale soil-landscape mapping. An indication of the variation within map units can be generated using the list of dominant and subdominant soils.
- As a consequence, it is essential to use the estimated value and confidence interval when making judgements on soil character and behaviour for any area.
- Some soil types are far more variable with respect to the interpreted properties than others.
- Many landscape processes (e.g. erosion, salinisation etc.) do not correlate in a simple way with the Atlas units because the description of soils is based on profile morphology. Profile morphology may have a poor or complex relationship with soil physical and chemical properties and, as a consequence, soil processes. Furthermore, landscape processes require more information before synoptic predictions can be made.
- The spatial arrangement of soils within a landscape may have an overriding impact on landscape processes (e.g. erodible soils along stream banks). The Digital Atlas and its associated tables provide limited information on spatial arrangement.
- The interpretations published by McKenzie et al. (2000) were prepared using published information supported by restricted first-hand experience. The interpretations were prepared as an interim measure.

Despite these daunting limitations, the Digital Atlas of Australian Soils have been useful for a range of applications at the continental level.

To provide a spatial feel for reliability, maps of the database sites (Figure 2-1) used to construct the PPF interpretations and of the four reliability measures (figure 2-2) are provided.

2.5.9 Improvements & remarks

Future

The Australian Soil Resource Information System (ASRIS) aims to provide an up-to-date overview of the soil resources of Australia. ASRIS was initiated through the National Land and Water Resources Audit (NLWRA) in 1999 (see NLWRA 2002, Henderson et al. 2002). The initial release (ASRIS 2001) provided primary inputs for a broad range of simulation modeling studies supported by the NLWRA. However, most of the estimates of soil hydraulic properties depended in one way or another on the interpretations of McKenzie et al. (2000).

The ASRIS 2001 team achieved a great deal given the short time available and daunting nature of the task (see Johnston et al. 2003). During the project, the core team and the Working Group on Land Resource Assessment (which acted as the Steering Committee) identified a series of deficiencies in the land resource information base for Australia. They also identified a logical pathway for overcoming these problems to ensure a greatly improved system for providing information to support natural resource management in Australia. The task was recognized to be long-term, and requiring a permanent project team (NLWRA 2002).

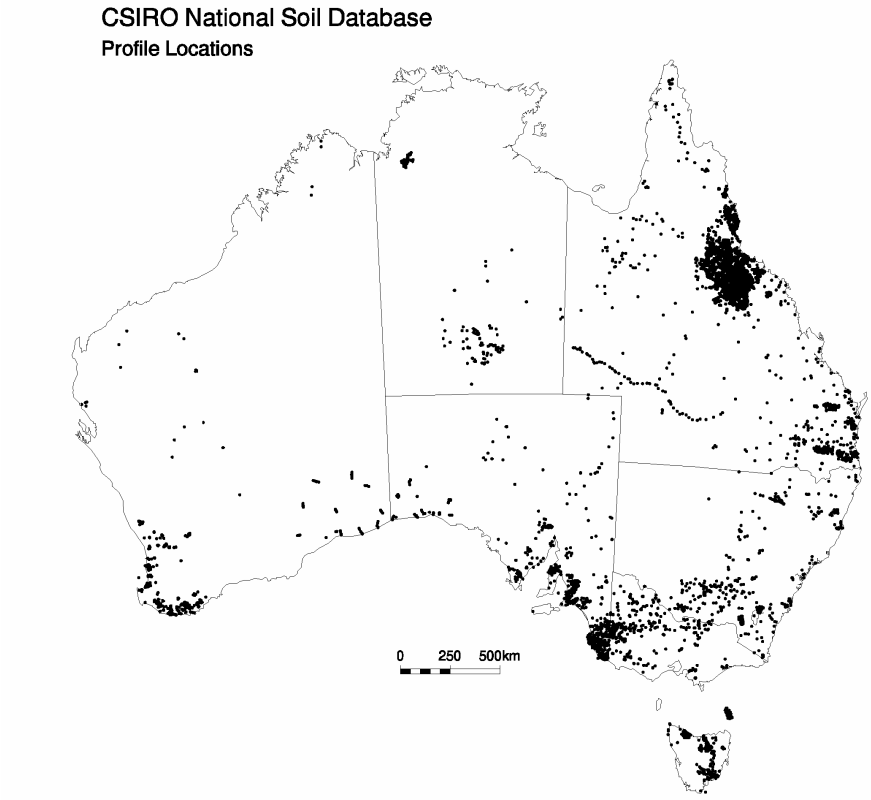

Figure 2-1: Locations of profiles held in the CSIRO National Soil Database (from McKenzie et al., 2000).

ASRIS will be progressively released during 2004 and 2006 (ASRIS 2004 and ASRIS 2006 respectively). The objectives of these releases will be to augment information provided by ASRIS 2001. More specifically, the releases will provide:

- A hierarchy of land units for the Australian Soil Resource Information System to allow comprehensive reporting on land suitability and soil resources from the National down to the Subregional scale. Upper levels of the hierarchy will be generated using digital terrain analysis and refinements of existing geomorphic maps. Lower levels will be derived from the component State, Territory and Commonwealth land resource map databases. There will also be the facility to represent soil and land resource

information using a number of other high-level stratifications including the Interim Biogeographic Regions of Australia (v5.1), Groundwater Flow Systems, and catchment management boundaries.

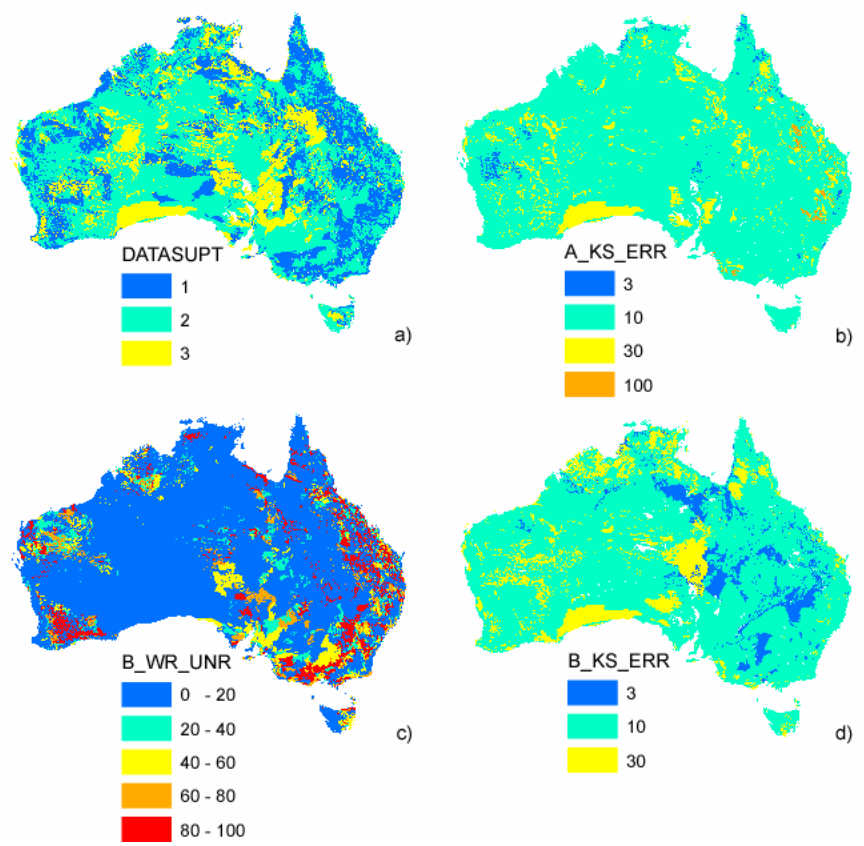

Figure 2-2: Maps showing the estimated uncertainty fields described above.

In general warm colours indicate more uncertainty. a) Data support (DATASUPT) for different soil landscape properties. b) A horizon Ksat uncertainty factor (A_KS_ERR). c) Proportion of area with unreliable B horizon water retention parameters (B_WR_UNR). d) B horizon Ksat uncertainty factor (A_KS_ERR).

- A consistent set of land qualities will be produced for the lowest level units in the hierarchy and these will be used to generate summaries for higher-level units. The land qualities relate to the intrinsic capability of land to support various land uses – they relate to soil depth, water storage, permeability, fertility, and erodibility.
- The new releases of ASRIS will be in two stages. ASRIS 2004 will contain the upper levels of the hierarchy for the whole country but lower levels will be initially from three States. ASRIS 2006 will contain the complete coverage for all levels and all States and Territories. Both releases will be provided via the Internet using SQL Server, the ARC Spatial Data Engine, and ARC Internet Map Server.
- ASRIS will also include a soil profile database that contains fully characterized sites that are known to be representative of significant areas and environments. ASRIS 2004 will contain approximately 5000 soil profiles with full quality assurance. The data will be accessible on-line and provide catchment managers with primary source material for improving land literacy in their region, and natural resource specialists with a fundamental data set for assessing and predicting resource condition. The profile database will be expanded to 10,000 profiles with the release of ASRIS 2006. A feature of the database will be the generation of estimates for a range of unmeasured attributes. These will be accompanied by statements of uncertainty.

- ASRIS 2004 and 2006 will include the original ASRIS 2001 soil information layers for the country in cases where improved coverages have not been generated.

While the precise details are yet to be confirmed, predictions of soil water storage in some parts of the country will most likely adopt the methods developed by the CRC for Catchment Hydrology (McKenzie et al. 2003).

2.6 Data type & format

This data set consists of spatial information on soil landscape category (as specified in the Atlas of Australian Soils) in Raster format and a database of soil properties linked to the soil landscape category. The spatial data derives from soil survey and the soil properties derive from an analysis of the CSIRO soil profile data base and application of pedotransfer functions, with further expert interpretation.

2.6.1 Application Formats

DIGITAL Map data are stored in ESRI ARCInfo Integer ASCII Grid format. An associated dbf file contains soil properties coded to the map soil landscape type.

2.6.2 Description of Files

This data set consists of nine sets of data files each containing the following:

aas_*.asc An ArcASCII file containing a raster of the soil landscape index.

aas_*.dbf A dBase file of soil properties linked to the soil landscape index.

aas_*.prj A file containing projection information in the ArcGIS format.

Here * can be ll for the unprojected (i.e. latitude and longitude) data or z??, where z?? stands for the Map Grid of Australia Universal Transverse Mercator Zone (i.e. zone 49 to 56).

soil_data_users_guide_1.0.0.pdf This user manual.

2.6.3 Data platform

Spatial data are available as ArcASCII format raster files. The associated database is a binary file in dBase or dbf format. The projection information is in ArcGIS format.

The raster maps can be used in Toolkit products that able input raster maps. The attribute tables should automatically link to the raster maps in such cases. Some functionality is available in some Toolkit products for clipping out data and resampling to match the resolution of other data sets. Instructions are available in the relevant software product documentation.

The raster maps are in a format that can also imported into most GIS systems using the inbuilt functionality of those systems. The tables of properties can then be linked to the maps in the GIS, allowing maps of individual properties to be accessed and manipulated.

2.6.4 Key References

McKenzie et al. (2000) (available from http://www.clw.csiro.au/publications/technical2000/) describe the development of estimates of the properties of principle profile forms and the

common principle profile forms found in each soil landscape represented in the Atlas of Australian Soils.

The Digital Atlas of Australian Soil (Bureau of Rural Sciences after Commonwealth Scientific and Industrial Research Organisation, 1991) is described in the meta data for that product (available from http://www.brs.gov.au/data/datasets)

These data sets will be replaced in the near future by updates to the Australian Soil Resources Information System (see §2.5.9 above).

2.7 Data structure and content

2.7.1 Data structure

The data consists of two components: 1) a map showing the distribution of soil types; and 2) a table with twenty-two fields that can be linked to the map.

Map data Raster maps in ArcInfo ASCII grid format provide an index representing soil landscape type on 0.01º (geographic coordinate system) or 1km (Map Grid of Australia) grids. An accompanying database contains the soil properties. Fields in the database are as follows.

- VALUE. This is the same as the numeric code or "Map Code" used to identify soil landscape units in the Digital Atlas of Australian Soils.
- MAP_UNIT. The soil landscape unit identifier used in the original Atlas of Australian Soils.
- DATASUPT. The interpretations of basic soil properties in McKenzie et al (2002) are derived from the CSIRO National Soils Database where possible and the availability of this information is provided in index form where 1 = >20 profiles + ancillary information, 2 = 5-20 profiles + ancillary information and 3 = interpolated from other PPF interpretations. This index reflects the relative data support for all subsequent interpretations. These indices were averaged using the weights in Table 1, 0.25 was then added to the average and the resulting value was rounded. This process provided a little more weight to the more uncertain PPFs in the soil landscape.
- SOLDEPTH. The weighted average of the solum depth values provided by McKenzie et al (2002). Note that for PPFs without a B horizon the solum depth was taken as equal to the A horizon depth. Units are m.
- SOLPAWHC. The weighted average of the solum plant available water holding capacity (PAWHC) values provided by McKenzie et al (2002). Solum PAWHC is defined as the sum of the PAWHC for the A and B horizons, which are calculated as (field capacity – wilting point)*horizon depth. Note that for PPFs without a B horizon the solum PAWHC was taken as equal to the A horizon PAWHC. Units are mm.
- A_THICK. The weighted average A horizon thickness from McKenzie et al. (2002). Units are m.
- A_KSAT. The weighted average of median A horizon saturated hydraulic conductivity (ksat) provided by McKenzie et al. (2002). McKenzie et al. provided classes of median ksat on a logarithmic scale where each class has a range of half an order of magnitude. These classes were converted to actual values of ksat, which were then averaged. The final values were rounded back (in the logarithmic domain) to the same precision as the original classes but are provided in units of mm/h.
- A_KS_ERR. McKenzie et al. (2002) provided an uncertainty for their ksat estimates in terms of ± a number of classes. These estimates were averaged and converted to a multiplicative factor. A value of 10 should be interpreted as an uncertainty equal to a factor of 10 (i.e. a range from A_ksat/10 to A_ksat*10).

- A_SAT. The averaged values of saturated volumetric water content for the A horizon provided by McKenzie et al. (2002). These were estimated by McKenzie et al. using their estimate of bulk density and Equation 12 from (Williams et al., 1992). Units are m
- A_FCP. The averaged values of volumetric water content at 0.1 bar suction or nominal field capacity. McKenzie estimated these using the Campbell (1985) soil hydraulic properties model and pedotransfer function estimates of the parameters for this model from Williams et al (1992) function 7 and their estimates of the relevant input characteristics.
- A_WP. The averaged values of volumetric water content at 15 bar suction or nominal wilting point. McKenzie estimated these using the Campbell (1985) soil hydraulic properties model and pedotransfer function estimates of the parameters for this model from Williams et al (1992) function 7 and their estimates of the relevant input characteristics.
- A_WR_UNR. This is the weighted proportion of PPFs in the soil landscape that were flagged as having unreliable water retention (field capacity, wilting point, PAWHC) parameters. Note that McKenzie et al. flag some estimates of water retention properties as low reliability and unreliable on the basis of estimated air entry potential or the Campbell b parameter but no A horizon values were flagged as such.
- B_PERCNT. This is the percentage of the soil landscape area with PPFs that have a B horizon characterised by McKenzie et al. Note that all subsequent B horizon averages apply to this proportion of the soil landscape, not the whole soil landscape.
- B_THICK. The weighted average B horizon thickness from McKenzie et al. (2002). Units are m.
- B_KSAT. The B horizon equivalent of A_ksat.
- B_KS_ERR. The B horizon equivalent of B_ksatErrorFactor.
- B_SAT. The B horizon equivalent of A_sat.
- B_FCP. The B horizon equivalent of B_fcp.
- B_WP. The B horizon equivalent of A_wp.
- B_WR_UNR. This is the weighted proportion of PPFs in the soil landscape that were flagged as having unreliable water retention (field capacity, wilting point, PAWHC) parameters. Note that McKenzie et al. flag some estimates of water retention properties as low reliability and unreliable on the basis of estimated air entry potential or the Campbell b parameter. Some PPFs have B horizon values were flagged as unreliable, none have B horizon values flagged as low reliability.

2.8 Glossary

PPF: Principal Profile Form. This is the lowest level categorisation in the Northcote (1979) soil classification scheme.

Soil landscape: The basic mapping unit used in the Atlas of Australian Soils. A soil landscape generally contains a number of PPFs

2.9 References

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Northcote, K. H. with Beckmann, G. G., Bettenay, E., Churchward, H. M., Van Dijk, D. C., Dimmock, G. M., Hubble, G. D., Isbell, R. F., McArthur, W. M., Murtha, G. G., Nicolls, K. D., Paton, T. R., Thompson, C. H., Webb, A. A. and Wright, M. J. (1960-1968). Atlas of Australian Soils, Sheets 1 to 10. With explanatory data (CSIRO Aust. and Melbourne University Press: Melbourne).

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Williams, J., Ross, P.J. and Bristow, K.L., 1992. Prediciton of the Campbell water retention function from texture, structure and organic matter. In: M.T. van Genuchten, F.J. Leij and L.J. Lund (Editors), Proceedings of the International Workshop on Indirect Methods for Estimating the Hydraulic Properties of Unsaturated Soils. University of California, Riverside, CA, University of California, Riverside, CA, pp. 427-441.

Dataset

ANZLIC ID
ANZCW1202000001

Title
Australian Groundwater Flow Systems - National Land and Water Resources Audit, January 2000.

Custodian
Bureau of Rural Sciences

Jurisdiction
Australia

Contact Address

Contact Organisation
NRIC, Bureau of Rural Sciences

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Manager, Data Sets

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Description

Abstract
**********DATASET ABSTRACT**********

The data shows the distribution of groundwater flow systems at a national scale. These flow systems were based on their hydrogeological characteristics using a combination of geology, geomorphology and topographical (Digital Elevation Model) information at a national scale. The groundwater

flowsystems identify the extent of groundwater processes contributing to salinity, together with the characteristic hydrogeological processes considered likely to result in dryland salinity given suitable climatic conditions.

****

Searchwords
GEOSCIENCES Hydrogeology; Models , GEOSCIENCES Hydrogeology; Models

Geographic Extent
112.9141 -43.6285
153.6195 -43.6285
153.6195 -10.0725
112.9141 -10.0725

National

Scale 1 : 5 000 000

Description of DOUBLE precision coverage flosys_g

FEATURE CLASSES

Feature Class	Subclass	Number of Features	Attribute data (bytes)	Spatial Index?	Topology?
ARCS		156176			
POLYGONS		91777	100	Yes	
NODES		105233			

SECONDARY FEATURES

Tics	4
Arc Segments	1265345
Polygon Labels	91788

TOLERANCES

Fuzzy = 0.0020 V Dangle = 0.0000 N

COVERAGE BOUNDARY

Xmin = 112.9141 Xmax = 153.6195
Ymin = -43.6285 Ymax = -10.0725

STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

COORDINATE SYSTEM DESCRIPTION

Projection GEOGRAPHIC
Units DD Spheroid AUSTRALIANNATIONAL
Parameters:

Dataset Currency

Beginning Currency Date
Not Known

Ending Currency Date
03FEB2000

Dataset Status

Status
Complete

Maintenance and Update Frequency
Not planned

Access

Stored Dataset Format
DIGITAL ArcInfo 7.2.1 under SunOS

Available Format Types
DIGITAL - ArcInfo , DIGITAL - ArcInfo

Access Constraints

1) The data provided are for the sole and exclusive use of the authorised individual or agency on a single licence basis.

2) Its use is to be acknowledged in any visual or published materials with a citation including the name of the data as "Australian Groundwater Flow Systems - National Land and Water Resources Audit, January 2000."

3) It is accepted that the data are provided without any offer of technical or other support apart from the accompanying documentation.

4) That you or your agency will not provide it to any other individual or agency without the written permission from BRS.

5) That it will not be used for direct commercial gain.

6) That any errors, omissions or suggestions for improvement should be made known directly to BRS (by e-mail to dataman@brs.gov.au or by mail to the Manager, Data sets, Science Secretariat, Bureau of Rural Sciences).

7) BRS does not accept any responsibility or liability for the outcomes of the use of the data/software.

Data Quality

Positional Accuracy
100 m to 1 km

Attribute Accuracy
See Coram et al., 1999 'Australian Groundwater Flow Systems Contributing to Dryland Salinty'.

Logical Consistency
Unknown

Completeness
Coram et al., 1999 'Australian Groundwater Flow Systems Contributing to Dryland Salinty' recommends that the spatial distribution of the groundwater flow system types be validated by undertaking hydrogeological studies and modelling of responsiveness (both spatially and temporally) to land use change in randomly selected catchments from each flow system type.

Metadata Date
09-FEB-2000

Further Information
Bureau of Rural Sciences ASDD node

Lineage
**********DATASET LINEAGE**********
The data were derived using 3 databases:
1. Bedrock Geology (BMR now AGSO): Bedrock theme derived from the black lineworkfor the 1976 Geology of Australia 1:2 500 000 scale;

2. Regolith Terrain Map of Australia (BMR now AGSO): Regolith polygons, BMR record 1987/27; 1:5 000 000 Regolith Terrain Map of Australia, and accompanying record 1986/27 Craig,M.A., D'Addario, G.W.,Gibson,D.L., and Ollier,C.D 1986.

3. Digital Elevation model of Australia, (AUSLIG); derived from AUSLIG 250m - 9 second DEM grid, resampled to 1000m.

The Bedrock Geology coverage polygons were reclassed into 5 geological types; Cainozoic Sediments; Cainozoic Volcanics, Mesozoic Sediments and Volcanics; Mesozoic Intrusives, Palaeozoic Intrusives,Metamorphic Sediments and Volcanics; Precambrian Intrusives, Metamorphics, Sediments and Volcanics.

The Regolith coverage polygons were reclassed into 46 separate classes, for further documentation of reclassing categaories see associated report, Coram et al., 1999 'Australian Groundwater Flow Systems Contributing to Dryland Salinty'pp 38 - 52.

These coverages were then converted to grid using the arc polygrid command with the default options. A subsequent matrix was produced using the 3 above grids to generate the output grid called lastfs - for further documentation of the matrix see the associated report, Coram et al., 1999 'Australian Groundwater Flow Systems Contributing to Dryland Salinty' pp 38 - 52. The resultant output grid was then converted back to polygons using the grid polygrid command. The final coverage was titled lastfs_p.

A Great Artesian Recharge Beds coverage was added using the erase and union commands to the lastfs_p coverage. The Great Artesian Recharge Beds coverage was derived by selecting Triassic and Jurassic and selected lower Cretaceous Sandstone formation beds from the Habermehl,M.A and Lau, J.E 1997 'Hydrogeology of the Freat Artesian basin, Australia 1:2 500 000 map AGSO. The coverage was then cleaned and built.

An associated look up table containing symbol numbers (for the cmyk20 shadeset) was created containing grid-code, symbol and flow_system items. Flow system item relates to a brief textual description of the flow system classes as displayed on Coram et al., 1999 'Australian Groundwater Flow Systems Contributing to Dryland Salinty' A0 map 1:5 000 000. The final coverage lastfs_p was then copied to produce the coverage flosys, the flosys coverage was then projected to geographic projection to create the coverage flosys_g coverage.

****

Entity Name
Flosys_g.e00

Entity Description
Distribution of groundwater flow systems

Feature Attribute Name
SYMBOL
Feature Attribute Definition
shadeset cmyk20 symbol numbers

Feature Attribute Name
FLOW_SYSTEM
Feature Attribute Definition
Textual Information pertaining to each flow system class

Feature Attribute Name
AREA
Feature Attribute Definition
Area of Polygons

Feature Attribute Name
GRID-CODE
Feature Attribute Definition
Default attribute field assigned by ArcInfo when converting from a grid (value attribute) to a vector coverage.

Entity Name
Flosyst.shp

Entity Description
Distribution of groundwater flow systems

Feature Attribute Name
SYMBOL
Feature Attribute Definition
shadeset cmyk20 symbol numbers

Feature Attribute Name
FLOW_SYSTEM
Feature Attribute Definition
Textual Information pertaining to each flow system class

Feature Attribute Name
AREA
Feature Attribute Definition
Area of Polygons

Feature Attribute Name
GRID-CODE
Feature Attribute Definition
Default attribute field assigned by ArcInfo when converting from a grid (value attribute) to a vector coverage.

Dataset TITLE
Surface geology of Australia 1:1,000,000 scale, Northern Territory

Dataset AUTHOR(S)
Liu, S.F.
Raymond, O.L.
Stewart, A.J.
Sweet, I.P.
Duggan, M.B.
Charlick, C.
Phillips, D.
Retter, A.J.

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
The 1:1 million scale "Geology of Northern Territory" dataset is compiled from the latest published 1:250 000 scale, and some 1:100 000 scale, geological map data. Some recent regional scale (1:500 000) datasets were used primarily to include recent research on stratigraphic associations (eg, Tennant Region, South Georgina Basin and Musgrave Block).

Much of the bedrock of the Northern Territory is covered by extensive Cainozoic regolith, mainly sand plains and dunes. In addition, extensive lateritic deposits cover large areas of the north of the Territory, and widespread black soil plains cover much of the northern Georgina Basin (Barkly Tablelands).

The oldest rocks in the Northern Territory comprise very limited exposures of Archaean granite, gneiss and schist in the Rum Jungle and Nanambu complexes in the Pine Creek Orogen, and gneiss of the Billabong Complex and metamorphosed arkose of the Browns Range Metamorphics in the Tanami Region.

Early to Middle Proterozoic rocks occur in several basement inliers in the north of the Territory which are overlain and separated by Neoproterozoic to Mesozoic basins. The inliers include: the structurally complex Pine Creek Orogen and Arnhem Inlier; the platform cover rocks of the McArthur, Victoria-Birrindudu and South Nicholson Basins in the north of the Territory; and rocks of the Tennant and Tanami regions in the central Northern Territory. These provinces consist predominantly of clastic sediments, lesser volcanics and some significant granite provinces such as the Cullen Batholith in the Pine Creek Orogen. The rocks were typically metamorphosed to greenschist facies but locally reached amphibolite to lower granulite facies during the Barramundi Orogeny (1860-1850 Ma) which was accompanied by late to post-tectonic magmatism.

The Proterozoic orogens of the Central Australian Mobile Belt in the southern Northern Territory include the rocks of the Arunta and Musgrave regions. These regions comprise predominantly clastic sediments and felsic intrusive rocks which were metamorphosed to amphibolite and granulite facies through the Early and Middle Proterozoic, followed by further re-activation, thrusting and retrogressive metamorphism during the Late Neoproterozoic to Middle Palaeozoic.

The Amadeus, Ngalia, Georgina, Wiso, Daly and Ord Basins are remnants of the extensive Centralian Superbasin that covered a large part of central Australia. Widespread marine clastic and carbonate sedimentation occurred from the Neoproterozoic (in the Amadeus and Ngalia Basins) to the Ordovician (Wiso and Daly Basins) and Devonian (Georgina and Amadeus Basins). Widespread sub-aerial flood basalts

(Kalkarindji Volcanic Group) covered a large portion of the northern part of the Northern Territory during the early Cambrian.

The Arafura, Money Shoal and Bonaparte Basins are located mostly offshore and contain Late Neoproterozoic to Mesozoic sediments, consisting of mixed terrestrial and marine clastics, marine carbonates and, in the Bonaparte Basin, a marine evaporite sequence.
The onshore Mesozoic Eromanga Basin consists mainly of terrestrial sandstones, overlain in the southeastern corner of the Territory by marine siltstones. Permian-Triassic sediments of the Pedirka Basin underlie, and crop out at the margins of, the Eromanga Basin. Thin but widespread Cretaceous sandstones, of marine and fluvial origin, also occur in the Dunmarra Basin which overlies parts of the Wiso, Daly and Georgina Basins.

Description SEARCH WORD(S)
GEOSCIENCES Geology

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
NORTHERN TERRITORY: NT

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -11
S_LAT: -26
E_LONG: 138
W_LONG: 129

Description GEOGRAPHIC EXTENT POLYGON(S)

Data Currency BEGINNING DATE
18-12-2006

Data Currency ENDING DATE
current

Dataset Status PROGRESS
In Progress

Dataset Status MAINTENANCE AND UPDATE FREQUENCY

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	**Description**
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access ACCESS CONSTRAINT
Subject to terms and conditions outlined in license agreement.

Data Quality LINEAGE

The NT portion of the surface geology map of Australia 1:1,000,000 scale was produced primarily from published 1:250 000 geological maps, including some details of NTGS's current (2005-2006) mapping in the Tanami - The Granites area. Regional compilations for the following areas were used: Geology of the Tennant Region (2004), Geology of the Sourthern Georgina Basin (2005), and Musgrave Block (2004).

Data Quality POSITIONAL ACCURACY
Positional accuracy is variable depending on the source data. Typical accuracy in areas of 250K scale map source data is less than 250 metres. Typical accuracy in areas of 500K source data is less than 500 metres.

Data Quality ATTRIBUTE ACCURACY
All polygons are fully attributed with geological unit name hierarchy according to the Australian Stratigraphic Index and feature level metadata according to the Geoscience Australia digital data dictionary (based on the National Geological Data Model version 1.0). All linework is attributed with geological attributes (ie: geological boundary, fault, water boundary) and feature level metadata according to the Geoscience Australia digital data dictionary. A geoscientist visually inspected the finished dataset to ensure the attributes were accurate and the data were consistent spatially with current scientific information.

Data Dictionay standard :
Geoscience Australia, Data Dictionary for GIS Products, Version 2006.01
http://www.ga.gov.au/standards/datadict.html.

Data Quality LOGICAL CONSISTENCY
The Arc/Info coverage dataset has been built with no label errors or intersecting arcs. Data structure conforms to the Geoscience Australia standard for a geology dataset. QA tests were also carried out on these data for completeness, correct spatial representation, attribute accuracy, logical consistency and correctness, and where appropriate for compliance with Geoscience Australia's data dictionary.

Data Dictionay standard :
Geoscience Australia, Data Dictionary for GIS Products, Version 2006.01
http://www.ga.gov.au/standards/datadict.html.

Data Quality COMPLETENESS
The geological information is complete within the bounding polygon. Systematic checks have been made of both unit and line information throughout the entire data set.

Contact Information CONTACT ORGANISATION
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Metadata Date METADATA DATE
18DEC2006

Additional Metadata ADDITIONAL METADATA
It is recommended that this data be referred to as:

Liu, S.L., Raymond, O.L., Stewart, A.J., Sweet, I.P., Duggan, M., Charlick, C., Phillips, D., Retter, A.J., 2006 Surface geology of Australia 1:1,000,000 scale, Northern Territory [Digital Dataset] Canberra: The Commonwealth of Australia, Geoscience Australia. http://www.ga.gov.au

Specialised Geographic Information System (GIS) software is required to view this data.

Descriptions of MAP_SYMB attribute field:
MAP_SYMB format = Drxy

1. D = unit age. Two letters may be used for units spanning for than one age periods.

Cainozoic	Cz
Quaternary	Q
Mesozoic	Mz
Cretaceous	K
Jurassic	J
Triassic	-R
Palaeozoic	Pz
Permian	P
Carboniferous	C
Devonian	D
Silurian	S
Ordovician	O
Cambrian	-C
Proterozoic	-P
Neoproterozoic	N
Mesoproterozoic	M
Palaeoproterozoic	L
Archaean	A

2. r = gross rock descriptor. A one letter code to reflect the broad lithological composition of the unit

IGNEOUS EXAMPLES
g felsic to intermediate intrusive granite, granodiorite, tonalite, monzonite, diorite, syenite

d mafic intrusive gabbro, dolerite, norite
f felsic extrusive / high level intrusive rhyolite, dacite, ignimbrite, pyroclastic rocks
a intermediate extrusive / high level intrusive andesite, trachyte, latite, pyroclastic rocks
b mafic extrusive / high level intrusive basalt, scoria, shoshonite, pyroclastic rocks
u ultramafic undivided (intrusive & extrusive) komatiite, high Mg basalt, pyroxenite, dunite, wehrlite
k alkaline ultramafic kimberlite, lamprophyre, carbonatite

SEDIMENTARY
s siliciclastic/undifferentiated sediment shale, siltstone, sandstone, conglomerate, mudstone
j volcanogenic sediment epiclastic sediments and breccias, greywacke, arkose
l carbonate sediment limestone, marl, dolomite
c non-carbonate chemical sediment chert, evaporite, phosphorite, BIF
o organic-rich rock coal, amber, oil shale

MIXED SEDIMENTARY & IGNEOUS
v felsic & mafic volcanics
i felsic & mafic intrusives
w volcanics & sediments

METAMORPHIC
y low-medium grade meta clastic sediment slate, phyllite, schist, quartzite
t low-medium grade metabasite mafic schist, greenstone, amphibolite
r low-medium grade metafelsite rhyolitic schist, meta-andesite
m calc-silicate and marble meta carbonates and calcareous sediments
n high grade metamorphic rock gneiss, granulite, migmatite
p high-P metamorphic rock eclogite, blueschist
h contact metamorphic rock hornfels, spotted slate
e metamorphosed ultramafic rocks serpentinite, talc schist, chlorite schist (no feldspars), tremolite schist, ultramafic amphibolite

OTHER
z fault / shear rock mylonite, fault breccia, cataclasite, gouge
q vein quartz vein, carbonate vein
x complex, undivided, unknown melange

3. xy = One or two letters to reflect the stratigraphic name of a unit. Where practical, these letters reflect stratigraphic grouping or hierarchy. For instance, formations within a named group should have letter symbols reflecting their parent group.

eg: Tomkinson Creek Group - Lsk
Bootu Formation - Lskb

End of file ...

Dataset TITLE
Surface geology of Australia 1:1,000,000 scale, Tasmania - 3rd edition

Dataset AUTHOR(S)
Raymond, O.L.
Liu, S.F.
Kilgour, P.

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
The 1:1 million scale Geology of Tasmania dataset is generalised from the 1:500 000 scale 'Geology of Tasmania' map published in 1999 by the Tasmanian Geological Survey, with updated granite nomenclature from the 2005 1:500000 scale 'Tasmanian Granites and Associated Mineralisation' map. The geology of Tasmania consists of a wide range of sedimentary, igneous and metamorphic rocks. The oldest rocks are Proterozoic clastic sedimentary rocks of the Tyennan and Rocky Cape Regions, which form basement cores in the central-west and north-west of Tasmania respectively. Low to medium grade metamorphic rocks are found in the Arthur Metamorphic Complex along the Arthur Lineament on the eastern margin of the Rocky Cape Region. The economically significant middle Cambrian Mt Read Volcanics, comprising calc-alkaline felsic to mafic volcanics, related intrusives and associated volcanosedimentary rocks, occur in an arcuate belt in the western part of Tasmania. The late Cambrian to early Devonia n Wurawina Supergroup, including the Eldon, Gordon and Denison Groups, is a sequence of mainly clastic sediments (siltstone, shale, sandstone, conglomerate) and minor limestone. The supergroup overlies the Mt Read Volcanics and crops out in the western and central parts of the state. The early Ordovician to early Devonian Mathinna Group, comprised of predominantly turbiditic metasediments, crops out in the north-east of the state. It is intruded by a suite of middle Devonian to early Carboniferous granitoids which extends across the northern part of Tasmania. The late Carboniferous to Triassic Parmeener Supergroup of the Tasmania Basin crops out over much of the state. It consists of Triassic fluviolacustrine and Permian glaciomarine sequences. Much of Tasmania's rugged landscape is formed of Jurassic dolerite which presently extends over half of the area of Tasmania. Tertiary basalt and related pyroclastic rocks are found across much of the state.

Description SEARCH WORD(S)
GEOSCIENCES
GEOSCIENCES Geology

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
VICTORIA: VIC

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -34
S_LAT: -39
E_LONG: 150
W_LONG: 140

Description GEOGRAPHIC EXTENT POLYGON(S)

Data Currency BEGINNING DATE
07-NOV-03

Data Currency ENDING DATE
Current

Dataset Status PROGRESS
Complete

Dataset Status MAINTENANCE AND UPDATE FREQUENCY
Irregular

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80
DIGITAL	mapinfo mapinfo file Geographic GDA94 GRS80

Access ACCESS CONSTRAINT
Subject to terms and conditions outlined in the license agreement.

Data Quality LINEAGE
The 1:1 million scale Geology of Tasmania dataset is generalised from the 1:500,000 scale 'Geology of Tasmania' map published in 1999 by the Tasmanian Geological Survey, with updated granite nomenclature from the 2005 1:500,000 scale 'Tasmanian Granites and Associated Mineralisation' map from Mineral Resources Tasmania.

Data Quality POSITIONAL ACCURACY
The original spatial accurac y of these data as supplied by Mineral Resources Tasmania, generalisation of rock units to fit 1:500,000 digital topography (coastline) base gives a final accuracy of up to +-500m. Even though generalisation has been performed in areas of the dataset the positional accuracy should remain the same as stated below:
Polygon boundaries approximate accuracy +/- 500m.
Linework approximate accuracy +/- 500m.
Coastline approximate accuracy +/- 500m

Data Quality ATTRIBUTE ACCURACY
All polygons are fully attributed with geological unit name hierarchy according to the Australian Stratigraphic Index and feature level metadata according to the Geoscience Australia digital data dictionary (based on the National Geological Data Model version 1.0). All linework is attributed with geological attributes (ie: geological boundary, fault, water boundary) and feature level metadata according to the Geoscience Australia digital data dictionary. A geoscientist visually inspected the finished dataset to ensure the attributes were accurate and the data were consistent spatially with current scientific information.

Data Dictionary standard:
Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality LOGICAL CONSISTENCY
The Arc/Info coverage dataset has been built with no label errors or intersecting arcs. Data structure conforms to the Geoscience Australia standard for a geology dataset. QA tests were also carried out on these data for completeness, correct spatial representation, attribute accuracy, logical consistency and correctness, and where appropriate for compliance with Geoscience Australia's data dictionary.

Data Dictionary standard:
Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality COMPLETENESS
Dataset is complete for extent of Victoria, including Phillip and French Islands.
The dataset is complete for intended use at 1:1 000 000 scale.

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Metadata Date METADATA DATE
05DEC2007

Additional Metadata ADDITIONAL METADATA
It is recommended that this data be referred to as:

Raymond, O.L., Liu, S.F., Kilgour, P., 2007
Surface geology of Australia 1:1,000,000 scale, Victoria - 3rd edition [Digital Dataset]
Canberra: The Commonwealth of Australia, Geoscience Australia.
http://www.ga.gov.au

Specialised Geographic Information System (GIS) software is required to view this data.

EXTENDED ABSTRACT

The geology of Victoria consists of a wide range of sedimentary, igneous and some metamorphic rocks. The oldest rocks are Cambrian clastic sedimentary rocks in the Glenelg River area, and greenstones along Moyston, Avoca, Heathcote and Governor faults. Most Cambrian rocks are metamorphosed to low-medium grade.

The Middle(?) Cambrian Nargoon Group consists of the Glenthompson Sandstone and undated and undifferentiated metasedimentary rocks between the Yarramyljup and Escondida faults in western Victoria. The Late Cambrian St Arnaud Group and interpreted lateral equivalents, including marine turbiditic sandstone, mudstone, and shale, crop out between the Moyston and Avoca faults in the western part of the state.

The Ordovician Castlemaine Supergroup, which occurs mostly between the Avoca and Heathcote faults in central-western Victoria, is a sequence of marine turbiditic sandstone, mudstone, black shale, and minor granule conglomerate. These rocks host the important Bendigo-Ballarat gold fields. Ordovician sediments in northeast Victoria (northeast of the Governor Fault) consist of the turbiditic sequences of the Adaminaby, Bendoc, and Kiandra groups. Silurian to middle Devonian clastic sedimentation in central Victoria between the Avoca and Governor faults is represented by the very thick Murridindi Supergroup of mainly siltstone and sandstone. Conglomerate is a minor component, and limestone rare.

Late Silurian to Early Devonian clastic sediments and limestones occur in scattered outcrop areas in eastern Victoria (e.g., Wentworth, Barmouth, Mt Tambo, Buchan, and Errinundra groups). Devonian felsic volcanic rocks occur across the state.

Some Cambrian and Ordovician granitic rocks are mapped in western Victoria in the Glenelg River area. Silurian granitic rocks occur in the east of the state and Early Devonian granitic rocks occur east of the Governor Fault and west of the Heathcote Fault. Middle to Late Devonian granitic rocks occur mainly in central Victoria.

Much of the Late Devonian Avon Supergroup of clastic sedimentary rocks outcrop in central-east Victoria, although some occur in far east of the state. Some early Carboniferous clastic sediments (e.g., the Boorhaman Conglomerate) occur in the northeast of the state.

Permian clastic sediments such as the Wild Duck Formation and equivalents, comprising glaciomarine and fluvial diamictite, sandstone, mudstone and conglomerate, occur in central and western Victoria.

The Triassic Mt Leinster Igneous Complex of granite, syenite, trachyte and volcaniclastic sediments are found in northeast Victoria. Jurassic trachyte lavas, (e.g. the Coleraine Trachyte), occur in far west of the state.

The Cretaceous Otway Group of fluvial volcaniclastic arkosic sandstone and mudstone occurs in the southern part of the state and extends offshore into Bass Strait.

Palaeocene to Oligocene basaltic lavas and associated pyroclastics and fluvial sediments (Older Volcanics) occur in scattered outcrop areas in the southwest part of the state, while Holocene to Miocene lavas flows and cinder cones (Newer Volcanics) occur in large areas of the southwest part of the state.

End of file ...

Dataset TITLE
Surface geology of Australia 1:1,000,000 scale, South Austalia

Dataset AUTHOR(S)
Whitaker, A.J.
Glanville. H.D.
English, P.M.
Stewart, A.J.
Retter, A.J.
Connolly, D.P.
Stewart, G.A.
Fisher, C.L.

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
Surface geology of Australia 1:1,000,000 scale, South Australia
The 1:1 million-scale "Geology of South Australia" dataset has been compiled from the latest published 1:250 000-scale and some 1:100 000-scale geological maps, modified to incorporate results of recent research by PIRSA in the Olary Domain.
Much of South Australia is covered by Cenozoic regolith, mainly sand plains, dunes, playas and colluvium, with lesser silcrete, calcrete and laterite.
Six main Precambrian provinces have been recognised: the Gawler and Curnamona Cratons, Musgrave Block, Officer Basin, Adelaide Fold Belt (Geosyncline) and Coompana Block (concealed).
The Gawler Craton outcrops in the centre and south. Neoarchaean igneous and sedimentary rocks of the Mulgathing and Sleaford Complexes form the basement of the Craton and were metamorphosed to granulite facies during the period 2.7 to 2.4 Ga. Clastic and chemical sediments of the Hutchison Group were deposited along the eastern margin of the Craton during the Palaeoproterozoic, and were subsequently deformed during the Kimban Orogeny (1850 to 1700 Ma). Little deformed Mesoproterozoic sediments and the Gawler Range Volcanics were deposited unconformably over the older rocks, mainly in the east of the Craton. Coeval granites of the Hiltaba Suite are distributed throughout the Craton.
Three domains of the Curnamona Craton - the Olary Domain, and Mt Babbage and Mt Painter Inliers - outcrop in the central east. They consist of Palaeoproterozoic schist and gneiss, metamorphosed and disrupted during the Olarian Orogeny (1700-1580Ma), and intruded by Palaeo- to Mesoproterozoic granite. The inliers were further disrupted by the Delamerian Orogeny (~500Ma) and are surrounded by Neoproterozoic to Cenozoic sediments.
The Musgrave Block in the northwest of the State comprises quartzofeldspathic orthogneiss and granite, and minor pelitic, siliceous and calcareous metasediments. Widespread metamorphism at about 1600 Ma was followed by extensive granite intrusion at about 1500 Ma. Emplacement of the mafic-ultramafic Giles Complex at about 1080 Ma occurred towards the end of metamorphism and granite emplacement of the Musgravian Orogeny (1225¿1075 Ma). During the Petermann Orogeny (~540 Ma), granulite of the southern Musgrave Block overthrust amphibolite facies gneiss north of the Woodroffe Thrust. Tectonic disruption on regional scale shear zones continued to the end of the Alice Springs Orogeny (400 ¿ 350 Ma).
During Neoproterozoic to Cambrian times, sedimentation occurred in shelf and trough settings in the Officer Basin (south of the Musgrave Block), and in the Adelaide Fold Belt. At times these basins were linked, yielding similar sedimentary sequences. The Adelaide Fold Belt was folded and disrupted during the Delamerian Orogeny (~500 Ma) and locally intruded by granite. Many of the intrusions are concealed by Murray Basin sediments, but coeval granites are exposed in the Padthaway Ridge inboard of the southeast coast.

Small Precambrian inliers are exposed elsewhere in the state. They include: the Ammaroodinna and Yoolperlunna Inliers southeast of the Musgrave Block; Peake, Denison and Mount Woods inliers north of the Gawler Craton; and Houghton, Warren, Aldgate, Oakbank, and Myponga Inliers within the Adelaide Fold Belt.
Carboniferous to Permian glaciation affected much of the state, and was followed by deposition of mixed marine and terrestrial sediments in the Mesozoic Eromanga Basin and Cenozoic Eyre, Murray, and Eucla Basins.

Description SEARCH WORD(S)
GEOSCIENCES Geology

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
SOUTH AUSTRALIA: SA

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -26
S_LAT: -39
E_LONG: 141
W_LONG: 129

Description GEOGRAPHIC EXTENT POLYGON(S)

Data Currency BEGINNING DATE
24-04-2007

Data Currency ENDING DATE
current

Dataset Status PROGRESS
In Progress

Dataset Status MAINTENANCE AND UPDATE FREQUENCY

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access ACCESS CONSTRAINT
Subject to terms and conditions outlined in license agreement.

Data Quality LINEAGE
The SA portion of the surface geology map of Australia 1:1,000,000 scale was produced primarily from published 1:250 000 geological maps, Regional compilations for the Musgrave Block were used.

Data Quality POSITIONAL ACCURACY
Positional accuracy is variable depending on the source data. Typical accuracy in areas of 250K scale map source data is less than 250 metres. Typical accuracy in areas of 500K source data is less than 500 metres.

Data Quality ATTRIBUTE ACCURACY
All polygons are fully attributed with geological unit name hierarchy according to the Australian Stratigraphic Index and feature level metadata according to the Geoscience Australia digital data dictionary (based on the National Geological Data Model version 1.0). All linework is attributed with geological attributes (ie: geological boundary, fault, water boundary) and feature level metadata according to the Geoscience Australia digital data dictionary. A geoscientist visually inspected the finished dataset to ensure the attributes were accurate and the data were consistent spatially with current scientific information.

Data Dictionay standard :
Geoscience Australia, Data Dictionary for GIS Products, Version 2006.01
http://www.ga.gov.au/standards/datadict.html.

Data Quality LOGICAL CONSISTENCY
The Arc/Info coverage dataset has been built with no label errors or intersecting arcs. Data structure conforms to the Geoscience Australia standard for a geology dataset. QA tests were also carried out on these data for completeness, correct spatial representation, attribute accuracy, logical consistency and correctness, and where appropriate for compliance with Geoscience Australia's data dictionary.

Data Dictionay standard :
Geoscience Australia, Data Dictionary for GIS Products, Version 2006.01
http://www.ga.gov.au/standards/datadict.html.

Data Quality COMPLETENESS
The geological information is complete within the bounding polygon. Systematic checks have been made of both unit and line information throughout the entire data set.

Contact Information CONTACT ORGANISATION
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Contact Information CONTACT POSITION
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sales@ga.gov.au

Metadata Date METADATA DATE
24APR2007

It is recommended that this data be referred to as:

Whitaker, A.J., Glanville, D.H., English, P.M., Stewart, A.J., Retter, A.J., Connolly, D.P., Stewart, G.A., Fisher, C.L., 2008

Surface geology of Australia 1:1,000,000 scale, South Australia [Digital Dataset]
Canberra: The Commonwealth of Australia, Geoscience Australia.
http://www.ga.gov.au

Specialised Geographic Information System (GIS) software is required to view this data.

Descriptions of MAP_SYMB attribute field:
MAP_SYMB format = Drxy

1. D = unit age. Two letters may be used for units spanning for than one age periods.

Cainozoic		Cz
Quaternary	Q	
Mesozoic		Mz
Cretaceous	K	
Jurassic	J	
Triassic	-R	
Palaeozoic	Pz	
Permian	P	
Carboniferous	C	
Devonian		D
Silurian	S	
Ordovician	O	
Cambrian		-C
Proterozoic	-P	
Neoproterozoic	N	
Mesoproterozoic	M	
Palaeoproterozoic	L	
Archaean		A

2. r = gross rock descriptor. A one letter code to reflect the broad lithological composition of the unit

IGNEOUS	**EXAMPLES**
g felsic to intermediate intrusive	granite, granodiorite, tonalite, monzonite, diorite, syenite
d mafic intrusive	gabbro, dolerite, norite
f felsic extrusive / high level intrusive	rhyolite, dacite, ignimbrite, pyroclastic rocks
a intermediate extrusive / high level intrusive	andesite, trachyte, latite, pyroclastic rocks
b mafic extrusive / high level intrusive	basalt, scoria, shoshonite, pyroclastic rocks
u ultramafic undivided (intrusive & extrusive)	komatiite, high Mg basalt, pyroxenite, dunite, wehrlite

k alkaline ultramafic kimberlite, lamprophyre, carbonatite

SEDIMENTARY

s siliciclastic/undifferentiated sediment shale, siltstone, sandstone, conglomerate, mudstone
j volcanogenic sediment epiclastic sediments and breccias, greywacke, arkose
l carbonate sediment limestone, marl, dolomite
c non-carbonate chemical sediment chert, evaporite, phosphorite, BIF
o organic-rich rock coal, amber, oil shale

MIXED SEDIMENTARY & IGNEOUS

v felsic & mafic volcanics
i felsic & mafic intrusives
w volcanics & sediments

METAMORPHIC

y low-medium grade meta clastic sediment slate, phyllite, schist, quartzite
t low-medium grade metabasite mafic schist, greenstone, amphibolite
r low-medium grade metafelsite rhyolitic schist, meta-andesite
m calc-silicate and marble meta carbonates and calcareous sediments
n high grade metamorphic rock gneiss, granulite, migmatite
p high-P metamorphic rock eclogite, blueschist
h contact metamorphic rock hornfels, spotted slate
e metamorphosed ultramafic rocks serpentinite, talc schist, chlorite schist (no feldspars), tremolite schist, ultramafic amphibolite

OTHER

z fault / shear rock mylonite, fault breccia, cataclasite, gouge
q vein quartz vein, carbonate vein
x complex, undivided, unknown melange

3. xy = One or two letters to reflect the stratigraphic name of a unit. Where practical, these letters reflect stratigraphic grouping or hierarchy. For instance, formations within a named group should have letter symbols reflecting their parent group.

eg: Tomkinson Creek Group - Lsk
Bootu Formation - Lskb

GA acknowledges the extensive collaboration with PIRSA Staff in provision of geological data, advice, and effort put into reviewing the product.
Users should note that the data have not been checked over by PIRSA for units Ordovician and younger, and thus should be considered preliminary in that regard.

End of file ...

Dataset TITLE
Surface geology of Australia 1:1,000,000 scale, Victoria - 3rd edition

Dataset AUTHOR(S)
Raymond, O.L.
Liu, S.F.
Kilgour, P.
Retter, A.J.
Connolly, D.P.

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
This dataset is based largely on the 1:1,000,000 scale "Victoria 1:1,000,000 Geology" map published in 1999 by the Geological Survey of Victoria (GSV). More recent and detailed GSV mapping (1:100,000 to 1:50,000 scale) has been used to update some areas, and all granitoid intrusions which were previously unclassified have been named and classified. The 1999 Victorian state data has been merged with the 1:1 000 000 "Geology of the Murray Basin" (BMR, 1991) dataset, primarily to achieve consistency in units across the Murray Basin in Victoria, South Australia and New South Wales.
The geology of Victoria consists of a wide range of sedimentary, igneous and some metamorphic rocks. The oldest rocks are Cambrian clastic sedimentary rocks in the Glenelg River area, and greenstones along Moyston, Avoca, Heathcote and Governor faults. Most Cambrian rocks are metamorphosed to low-medium grade.
The Middle(?) Cambrian Nargoon Group consists of the Glenthompson Sandstone and undated and undifferentiated metasedimentary rocks between the Yarramyljup and Escondida faults in western Victoria. The Late Cambrian St Arnaud Group and interpreted lateral equivalents, including marine turbiditic sandstone, mudstone, and shale, crop out between the Moyston and Avoca faults in the western part of the state.
The Ordovician Castlemaine Supergroup, which occurs mostly between the Avoca and Heathcote faults in central-western Victoria, is a sequence of marine turbiditic sandstone, mudstone, black shale, and minor granule conglomerate. These rocks host the important Bendigo-Ballarat gold fields. Ordovician sediments in northeast Victoria (northeast of the Governor Fault) consist of the turbiditic sequences of the Adaminaby, Bendoc, and Kiandra groups. Silurian to middle Devonian clastic sedimentation in central Victoria between the Avoca and Governor faults is represented by the very thick Murridindi Supergroup of mainly siltstone and sandstone. Conglomerate is a minor component, and limestone rare.
Late Silurian to Early Devonian clastic sediments and limestones occur in scattered outcrop areas in eastern Victoria (e.g., Wentworth, Barmouth, Mt Tambo, Buchan, and Errinundra groups). Devonian felsic volcanic rocks occur across the state.
Some Cambrian and Ordovician granitic rocks are mapped in western Victoria in the Glenelg River area. Silurian granitic rocks occur in the east of the state and Early Devonian granitic rocks occur east of the Governor Fault and west of the Heathcote Fault. Middle to Late Devonian granitic rocks occur mainly in central Victoria.
Much of the Late Devonian Avon Supergroup of clastic sedimentary rocks outcrop in central-east Victoria, although some occur in far east of the state. Some early Carboniferous clastic sediments (e.g., the Boorhaman Conglomerate) occur in the northeast of the state.
Permian clastic sediments such as the Wild Duck Formation and equivalents, comprising glaciomarine and fluvial diamictite, sandstone, mudstone and conglomerate, occur in central and western Victoria.
The Triassic Mt Leinster Igneous Complex of granite, syenite, trachyte and volcaniclastic sediments are found in northeast Victoria. Jurassic trachyte lavas, (e.g. the Coleraine Trachyte), occur in far west of the state.

The Cretaceous Otway Group of fluvial volcaniclastic arkosic sandstone and mudstone occurs in the southern part of the state and extends offshore into Bass Strait.
Palaeocene to Oligocene basaltic lavas and associated pyroclastics and fluvial sediments (Older Volcanics) occur in scattered outcrop areas in the southwest part of the state, while Holocene to Miocene lavas flows and cinder cones (Newer Volcanics) occur in large areas of the southwest part of the state.

Description SEARCH WORD(S)
GEOSCIENCES
GEOSCIENCES Geology

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
VICTORIA: VIC

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -34
S_LAT: -39
E_LONG: 150
W_LONG: 140

Description GEOGRAPHIC EXTENT POLYGON(S)

Data Currency BEGINNING DATE
07-NOV-03

Data Currency ENDING DATE
Current

Dataset Status PROGRESS
Complete

Dataset Status MAINTENANCE AND UPDATE FREQUENCY
Irregular

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80
DIGITAL	mapinfo mapinfo file Geographic GDA94 GRS80

Access ACCESS CONSTRAINT
Subject to terms and conditions outlined in the license agreement.

Data Quality LINEAGE
In 2001 AGSO (now Geoscience Australia) did contract work for Geological Survey of Victoria, converting the 1999 GSV 1:1 million scale geological map of Victoria from GENAMAP to ArcInfo format, adding attributes according to the Victorian data dictionary and then QA/QC the data. This data was then used by Geoscience Australia as the base for the current dataset. Line and polygon attributes have been updated to current GA standards. Over 300 granite bodies, which were unnamed in the original 1:1 million scale data, have also be named and classified. Cainozoic units were added from the Geology of the Murray Basin 1:1million scale map (BMR, 1991), and considerable work has been done to blend these two datasets together. Since the

2nd edition of this data, some areas of western and eastern Victoria have been recompiled based on more recent 1:100,000 and 1:50,000 scale mapping by Geoscience Victoria.

Data Quality POSITIONAL ACCURACY
This data has a nominal scale of 1:1,000,000. Positional accuracy is variable depending on the source data. Linework from the original Geoscience Victoria data is generally accurate to between 1000 and 500 metres. More recently compiled data is generally accurate to between 200 and 500 metres.

Data Quality ATTRIBUTE ACCURACY
All polygons are fully attributed with geological unit name hierarchy according to the Australian Stratigraphic Index and feature level metadata according to the Geoscience Australia digital data dictionary (based on the National Geological Data Model version 1.0). All linework is attributed with geological attributes (ie: geological boundary, fault, water boundary) and feature level metadata according to the Geoscience Australia digital data dictionary. A geoscientist visually inspected the finished dataset to ensure the attributes were accurate and the data were consistent spatially with current scientific information.

Data Dictionary standard:
Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality LOGICAL CONSISTENCY
The Arc/Info coverage dataset has been built with no label errors or intersecting arcs. Data structure conforms to the Geoscience Australia standard for a geology dataset. QA tests were also carried out on these data for completeness, correct spatial representation, attribute accuracy, logical consistency and correctness, and where appropriate for compliance with Geoscience Australia's data dictionary.

Data Dictionary standard:
Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality COMPLETENESS
Dataset is complete for extent of Victoria, including Phillip and French Islands.
The dataset is complete for intended use at 1:1 000 000 scale.

Contact Information CONTACT ORGANISATION
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Metadata Date METADATA DATE
05DEC2007

Additional Metadata ADDITIONAL METADATA
It is recommended that this data be referred to as:

Raymond, O.L., Liu, S.F., Kilgour, P., Retter, A.J., Connolly, D.P., 2007
Surface geology of Australia 1:1,000,000 scale, Victoria - 3rd edition [Digital Dataset]
Canberra: The Commonwealth of Australia, Geoscience Australia.
http://www.ga.gov.au

Specialised Geographic Information System (GIS) software is required to view this data.

EXTENDED ABSTRACT
The geology of Victoria consists of a wide range of sedimentary, igneous and some metamorphic rocks. The oldest rocks are Cambrian clastic sedimentary rocks in the Glenelg River area, and greenstones along Moyston, Avoca, Heathcote and Governor faults. Most Cambrian rocks are metamorphosed to low-medium grade.
The Middle(?) Cambrian Nargoon Group consists of the Glenthompson Sandstone and undated and undifferentiated metasedimentary rocks between the Yarramyljup and Escondida faults in western Victoria. The Late Cambrian St Arnaud Group and interpreted lateral equivalents, including marine turbiditic sandstone, mudstone, and shale, crop out between the Moyston and Avoca faults in the western part of the state.
The Ordovician Castlemaine Supergroup, which occurs mostly between the Avoca and Heathcote faults in central-western Victoria, is a sequence of marine turbiditic sandstone, mudstone, black shale, and minor granule conglomerate. These rocks host the important Bendigo-Ballarat gold fields. Ordovician sediments in northeast Victoria (northeast of the Governor Fault) consist of the turbiditic sequences of the Adaminaby, Bendoc, and Kiandra groups. Silurian to middle Devonian clastic sedimentation in central Victoria between the Avoca and Governor faults is represented by the very thick Murridindi Supergroup of mainly siltstone and sandstone. Conglomerate is a minor component, and limestone rare.
Late Silurian to Early Devonian clastic sediments and limestones occur in scattered outcrop areas in eastern Victoria (e.g., Wentworth, Barmouth, Mt Tambo, Buchan, and Errinundra groups). Devonian felsic volcanic rocks occur across the state.
Some Cambrian and Ordovician granitic rocks are mapped in western Victoria in the Glenelg River area. Silurian granitic rocks occur in the east of the state and Early Devonian granitic rocks occur east of the Governor Fault and west of the Heathcote Fault. Middle to Late Devonian granitic rocks occur mainly in central Victoria.
Much of the Late Devonian Avon Supergroup of clastic sedimentary rocks outcrop in central-east Victoria, although some occur in far east of the state. Some early Carboniferous clastic sediments (e.g., the Boorhaman Conglomerate) occur in the northeast of the state.
Permian clastic sediments such as the Wild Duck Formation and equivalents, comprising glaciomarine and fluvial diamictite, sandstone, mudstone and conglomerate, occur in central and western Victoria.

The Triassic Mt Leinster Igneous Complex of granite, syenite, trachyte and volcaniclastic sediments are found in northeast Victoria. Jurassic trachyte lavas, (e.g. the Coleraine Trachyte), occur in far west of the state.
The Cretaceous Otway Group of fluvial volcaniclastic arkosic sandstone and mudstone occurs in the southern part of the state and extends offshore into Bass Strait.
Palaeocene to Oligocene basaltic lavas and associated pyroclastics and fluvial sediments (Older Volcanics) occur in scattered outcrop areas in the southwest part of the state, while Holocene to Miocene lavas flows and cinder cones (Newer Volcanics) occur in large areas of the southwest part of the state.

End of file ...

Dataset TITLE
Surface geology of Australia 1:1,000,000 scale, Queensland - 2nd edition

Dataset AUTHOR(S)
Whitaker, A.J.
Champion, D.C.
Sweet, I.P.
Kilgour, P.
Connolly, D.P.

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
The surface geology of Queensland ranges in age from Palaeoproterozoic to Recent. The oldest rocks largely occur in the Mount Isa and Georgetown Inliers in the northwest and central north of the state respectively. These rocks have undergone greenschist to amphibolite facies metamorphism and were extensively intruded by granite during the Mesoproterozoic. Metamorphics of Meso to Neoproterozoic age occur in the Coen Inlier in eastern Cape York, in the Hughenden-Charters Towers-Townsville region to the south and east of Georgetown, and also further south in the Anakie Inlier.
During Cambrian to Ordovician times, extensive carbonate dominated, marine sedimentation took place in the Georgina Basin, West and southwest of Mount Isa. These rocks were subsequently faulted and gently folded prior to the Devonian, perhaps during the mid-Ordovician Thompson Orogeny. Silurian to Devonian marine sedimentation is preserved in the Hodgkinson and Broken River Basins in the north east of the state while similar aged, arc related deposits accumulated in the New England Orogen which occupies a 200 km wide coastal strip between Bowen and Brisbane in the southeast of the State. The Hodgkinson - Georgetown region and New England Orogen were extensively intruded by granite during Carboniferous to Permian times. Permian to Triassic sediments of the Galilee and Bowen Basins outcrop in the central east of the state while similar aged sediments accumulated to the east and southeast within the New England Orogen. Widespread sedimentation during the Jurassic to Cretaceous (Carpentaria, Eromanga, Mulgildie, Surat, and Laura Basins) blanketed large areas of older bedrock, particularly in the central, southern and south western parts of the state. Finally, Cainozoic cover units comprise approximately half the surface geology with sand plain (Czs), sand plain with dunes (Czd), colluvium (Qrc), alluvium (Qa), and Tertiary to Quaternary basalt flows comprising the major components.
The data set was initially compiled from older regional data sets including those covering the Eromanga, Surat and Carpentaria-Karumba Basins. Extensive areas have been recompiled using more recent 1:250 000 and 1:100 000 scale mapping, particularly in the Georgetown-Charters Towers-Ebagoola region, and also the area of the New England Orogen. The data set includes nearly 1800 named, informal and unnamed units.

Description SEARCH WORD(S)
GEOSCIENCES Geology

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
QUEENSLAND: QLD

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -8.9
S_LAT: -29.2
E_LONG: 154
W_LONG: 137.9

Description GEOGRAPHIC EXTENT POLYGON(S)

Data Currency BEGINNING DATE
2002

Data Currency ENDING DATE
Current

Dataset Status PROGRESS

Dataset Status MAINTENANCE AND UPDATE FREQUENCY
Irregular

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access ACCESS CONSTRAINT
Subject to terms and conditions outlined in the license agreement.

Data Quality LINEAGE
Digital data were largely obtained from the Geological Survey of Queensland (GSQ) and were derived from numerous map compilations designed for use at scales between 1:1.5 Million and 1:100,000. The digital data in this compilation were either directly incorporated; generalised first; or redrawn scanned and vectorised before incorporation. All the data sources are documented in the feature-level metadata in the dataset.

All surface geological polygons were assigned a STRATNO index number from the Australian Stratigraphic Units database. Named units were assigned 'current' Stratigraphic Index numbers, while unnamed (eg. many unconsolidated Cainozoic units) and informal units were entered into the database and also received a STRATNO. Polygon and line attributes were updated to current GA standards for regional data sets. Most polygons smaller than 0.01 dec. deg. square (i.e. ~1 sq km; often fault slivers) were removed from the data. However, many important small units, determined by rock type, abundance, and distribution, were enlarged and retained to provide representative distribution.

Data Quality POSITIONAL ACCURACY
The dataset has an approximate positional accuracy of about 1km for data derived from the older regional data sets but may be accurate to less than 500m in areas compiled from modern 1:250 000 or 1:1 00 000 data. The positional accuracy of boundaries that have been generalised for the scale, particularly regolith boundaries, may be less than the figures mentioned above.

Data Quality ATTRIBUTE ACCURACY
All polygons are fully attributed with geological unit name hierarchy according to the Australian Stratigraphic Index and feature level metadata according to the Geoscience Australia digital data dictionary (based on the National Geological Data Model version 1.0). All linework is attributed with geological attributes (ie: geological boundary, fault, water boundary) and feature level metadata according to the

Geoscience Australia digital data dictionary. A geoscientist visually inspected the finished dataset to ensure the attributes were accurate and the data were consistent spatially with current scientific information.

Data Dictionary standard:

Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality LOGICAL CONSISTENCY

The Arc/Info coverage dataset has been built with no label errors or intersecting arcs. Data structure conforms to the Geoscience Australia standard for a geology dataset. QA tests were also carried out on these data for completeness, correct spatial representation, attribute accuracy, logical consistency and correctness, and where appropriate for compliance with Geoscience Australia's data dictionary.

Data Dictionary standard:

Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality COMPLETENESS

The geological information is complete within the bounding polygon. Systematic checks have been made of both unit and line information throughout the entire data set.

Contact Information CONTACT ORGANISATION

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Contact Information CONTACT POSITION

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Metadata Date METADATA DATE
05DEC2007

Additional Metadata ADDITIONAL METADATA
It is recommended that this data be referred to as:

Whitaker, A.J., Champion, D.C., Sweet, I.P., Kilgour, P., Connolly, D.P., 2007
Surface geology of Australia 1:1,000,000 scale, Queensland 2nd edition [Digital Dataset]
Canberra: The Commonwealth of Australia, Geoscience Australia.
http:/www.ga.gov.au

Specialised Geographic Information System (GIS) software is required to view this data.

Descriptions of MAP_SYMB attribute field:
MAP_SYMB format = Trxy

1. T = unit age. Two letters may be used for units spanning for than one age periods.

Cainozoic	Cz
Quaternary	Q
Tertiary	T
Mesozoic	Mz
Cretaceous	K
Jurassic	J
Triassic	-R
Palaeozoic	Pz
Permian	P
Carboniferous	C
Devonian	D
Silurian	S
Ordovician	O
Cambrian	-C
Proterozoic	-P
Neoproterozoic	N
Mesoproterozoic	M
Palaeoproterozoic	L
Archaean	A

2. r = gross rock descriptor. A one letter code to reflect the broad lithological composition of the unit

IGNEOUS	**EXAMPLES**
g felsic to intermediate intrusive	granite, granodiorite, tonalite, monzonite, diorite, syenite
d mafic intrusive	gabbro, dolerite, norite
f felsic extrusive / high level intrusive	rhyolite, dacite, ignimbrite, pyroclastic rocks
a intermediate extrusive / high level intrusive	andesite, trachyte, latite, pyroclastic rocks
b mafic extrusive / high level intrusive	basalt, scoria, shoshonite, pyroclastic rocks
u ultramafic undivided (intrusive & extrusive)	komatiite, high Mg basalt, pyroxenite, dunite, wehrlite
k alkaline ultramafic	kimberlite, lamprophyre, carbonatite

SEDIMENTARY	
s siliciclastic/undifferentiated sediment	shale, siltstone, sandstone, conglomerate, mudstone
j volcanogenic sediment	epiclastic sediments and breccias, greywacke, arkose
l carbonate sediment	limestone, marl, dolomite
c non-carbonate chemical sediment	chert, evaporite, phosphorite, BIF
o organic-rich rock	coal, amber, oil shale

MIXED SEDIMENTARY & IGNEOUS

v felsic & mafic volcanics
i felsic & mafic intrusives
w volcanics & sediments

METAMORPHIC

y low-medium grade meta clastic sediment slate, phyllite, schist, quartzite
t low-medium grade metabasite mafic schist, greenstone, amphibolite
r low-medium grade metafelsite rhyolitic schist, meta-andesite
m calc-silicate and marble meta carbonates and calcareous sediments
n high grade metamorphic rock gneiss, granulite, migmatite
p high-P metamorphic rock eclogite, blueschist
h contact metamorphic rock hornfels, spotted slate
e metamorphosed ultramafic rocks serpentinite, talc schist, chlorite schist (no feldspars), tremolite schist, ultramafic amphibolite

OTHER

z fault / shear rock mylonite, fault breccia, cataclasite, gouge
q vein quartz vein, carbonate vein
x complex, undivided, unknown melange

3. xy = One or two letters to reflect the stratigraphic name of a unit. Where practical, these letters reflect stratigraphic grouping or hierarchy. For instance, formations within a named group may have letter symbols reflecting their parent group.

eg: Eulo Queen Group - Jse
Hampstead Sandstone - Jseh
Loth Formation - Jsel

End of file ...

Dataset TITLE
Surface geology of Australia 1:1,000,000 scale, New South Wales - 2nd edition

Dataset AUTHOR(S)
Raymond, O.L.
Liu, S.F.
Kilgour, P.
Retter, A.J.
Stewart, A.J.
Stewart, G.

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
The surface geology of New South Wales comprises rocks ranging in age from the Palaeoproterozoic to recent. The oldest rocks are the strongly deformed and metamorphosed Willyama Supergroup of the Curnamona Craton in far western New South Wales. Neoproterozoic to Cambrian shallow marine to continental sediments and volcanics overlie the margin of the Curnamona Craton.

The south-eastern part of New South Wales is dominated by the Palaeozoic sediments, volcanics and granites of the Lachlan Orogen. These rocks occur from the eastern Victorian border to the Cobar region and underlie the southern highlands. North-eastern New South Wales is underlain by the Palaeozoic to Mesozoic rocks of the New England Orogen. The Lachlan and New England Orogens are overlain by sedimentary basins of Permian to Recent age. Permian to Cretaceous sediments of the Sydney-Bowen, Gunnedah and Clarence-Moreton Basins overlie the two orogens in eastern New South Wales. Sediments of the Mesozoic Eromanga, Surat and Berri Basins occur in the north and west of New South Wales; and the Cainozoic Murray Basin covers the majority of the south-west of the state. The Cainozoic regolith units of New South Wales are represented in this dataset according to a simplified classification scheme which is being applied nationally at 1:1 000 000 scale.

The dataset was generalised largely from the 2003 version of the New South Wales Department of Mineral Resources (NSWDMR) state digital geology dataset, comprising 1:250 000 to 1:100 000 scale mapping data. Some areas (denoted in the dataset feature-level metadata) have been recompiled from more recent mapping data sourced from NSWDMR. In other areas, such as the Broken Hill region and the Murray Basin region, 1:500 000 and 1:1 000 000 scale data was incorporated from published regional maps.

Compilation of the seamless state dataset necessarily involved much edgematching of source datasets due to their varying ages and original compilation scales. Adjustment of some older geological datasets was made using geophysical data interpretation where particularly poor edgematching or spatial accuracy (± 1 km) was identified in source data.

Description SEARCH WORD(S)
GEOSCIENCES Geology

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
NEW SOUTH WALES: NSW

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -28
S_LAT: -37.5

E_LONG: 154
W_LONG: 141

Description GEOGRAPHIC EXTENT POLYGON(S)

Data Currency BEGINNING DATE
13JUL2005

Data Currency ENDING DATE
Current

Dataset Status PROGRESS
In Progress

Dataset Status MAINTENANCE AND UPDATE FREQUENCY
As required

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access ACCESS CONSTRAINT
Subject to terms and conditions outlined in the license agreement.

Data Quality LINEAGE
The various data sources for this dataset are detailed in the feature-level attribue metadata attached to the dataset.

The dataset was generalised largely from the 2003 version of the New South Wales Department of Mineral Resources (NSWDMR) state digital geology dataset, comprising 1:250 000 to 1:100 000 scale mapping data. Some areas, particularly in the north-east of the state (eg: Moree, Inverell, Tamworth, Manilla) and central-west (eg: Goulburn, Lake Cargellico) were recompiled from more recent data sourced from NSWDMR in 2004-5.

The basement geology of the Broken Hill region was compiled from 1996 1:500 000 scale data from the national, NSW and SA geological surveys. The Murray Basin region was compiled from 1991 1:1 000 000 scale data from AGSO.

Compilation of the seamless state dataset necessarily involved much editing of original data along the edges (edgematching) of source datasets due to their varying ages and original compilation scales. Adjustment of some older geological data was made using geophysical data interpretation where particularly poor edgematching or spatial accuracy (± 1 km) was identified in the source data.

Data Quality POSITIONAL ACCURACY
Positional accuracy is variable depending on the source data. Typical accuracy in areas of 250K scale map source data is 50-200 metres. Typical accuracy in areas of 500K to 1M scale source data is 100-500 metres.

Data Quality ATTRIBUTE ACCURACY

All polygons are fully attributed with geological unit name hierarchy according to the Australian Stratigraphic Index and feature level metadata according to the Geoscience Australia digital data dictionary (based on the National Geological Data Model version 1.0). All linework is attributed with geological attributes (ie: geological boundary, fault, water boundary) and feature level metadata according to the Geoscience Australia digital data dictionary. A geoscientist visually inspected the finished dataset to ensure the attributes were accurate and the data were consistent spatially with current scientific information.

Data Dictionary standard:

Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality LOGICAL CONSISTENCY

The Arc/Info coverage dataset has been built with no label errors or intersecting arcs. Data structure conforms to the Geoscience Australia standard for a geology dataset. QA tests were also carried out on these data for completeness, correct spatial representation, attribute accuracy, logical consistency and correctness, and where appropriate for compliance with Geoscience Australia's data dictionary.

Data Dictionary standard:

Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01
http://www.ga.gov.au/standards/datadict.html

Data Quality COMPLETENESS

The geological information is complete within the bounding polygon. Systematic checks have been made of both unit and line information throughout the entire data set.

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Metadata Date METADATA DATE
05DEC2007

Additional Metadata ADDITIONAL METADATA
It is recommended that this data be referred to as:

Raymond, O.L., Liu, S.F., Kilgour, P., Retter, A.J., Stewart, A.J., Stewart, G., 2007
Surface geology of Australia 1:1,000,000 scale, New South Wales 2nd edition [Digital Dataset]
Canberra: The Commonwealth of Australia, Geoscience Australia.
http://www.ga.gov.au

Specialised Geographic Information System (GIS) software is required to view this data.

Descriptions of MAP_SYMB attribute field:
MAP_SYMB format = Trxy

1. T = unit age. Two letters may be used for units spanning for than one age periods.

Cainozoic		Cz
Quaternary	Q	
Tertiary	T	
Mesozoic		Mz
Cretaceous	K	
Jurassic	J	
Triassic	-R	
Palaeozoic	Pz	
Permian	P	
Carboniferous	C	
Devonian		D
Silurian	S	
Ordovician	O	
Cambrian		-C
Proterozoic	-P	
Neoproterozoic	N	
Mesoproterozoic	M	
Palaeoproterozoic	L	
Archaean		A

2. r = gross rock descriptor. A one letter code to reflect the broad lithological composition of the unit

IGNEOUS	**EXAMPLES**
g felsic to intermediate intrusive	granite, granodiorite, tonalite, monzonite, diorite, syenite
d mafic intrusive	gabbro, dolerite, norite
f felsic extrusive / high level intrusive	rhyolite, dacite, ignimbrite, pyroclastic rocks
a intermediate extrusive / high level intrusive	andesite, trachyte, latite, pyroclastic rocks
b mafic extrusive / high level intrusive	basalt, scoria, shoshonite, pyroclastic rocks
u ultramafic undivided (intrusive & extrusive)	komatiite, high Mg basalt, pyroxenite, dunite, wehrlite
k alkaline ultramafic	kimberlite, lamprophyre, carbonatite

SEDIMENTARY

s siliciclastic/undifferentiated sediment	shale, siltstone, sandstone, conglomerate, mudstone

j volcanogenic sediment — epiclastic sediments and breccias, greywacke, arkose
l carbonate sediment — limestone, marl, dolomite
c non-carbonate chemical sediment — chert, evaporite, phosphorite, BIF
o organic-rich rock — coal, amber, oil shale

MIXED SEDIMENTARY & IGNEOUS
v felsic & mafic volcanics
i felsic & mafic intrusives
w volcanics & sediments

METAMORPHIC
y low-medium grade meta clastic sediment — slate, phyllite, schist, quartzite
t low-medium grade metabasite — mafic schist, greenstone, amphibolite
r low-medium grade metafelsite — rhyolitic schist, meta-andesite
m calc-silicate and marble — meta carbonates and calcareous sediments
n high grade metamorphic rock — gneiss, granulite, migmatite
p high-P metamorphic rock — eclogite, blueschist
h contact metamorphic rock — hornfels, spotted slate
e metamorphosed ultramafic rocks — serpentinite, talc schist, chlorite schist (no feldspars), tremolite schist, ultramafic amphibolite

OTHER
z fault / shear rock — mylonite, fault breccia, cataclasite, gouge
q vein — quartz vein, carbonate vein
x — complex, undivided, unknown melange

3. xy = One or two letters to reflect the stratigraphic name of a unit. Where practical, these letters reflect stratigraphic grouping or hierarchy. For instance, formations within a named group should have letter symbols reflecting their parent group.

eg: Manning Group - Psm
Colraine Mudstone - Psmc
Echo Hills Formation - Psme

End of file ...

Dataset TITLE
Surface geology of Australia 1:1,000,000 scale, Western Australia

Dataset AUTHOR(S)
Stewart, A.J.
Sweet, I.P.
Needham, R.S.
Raymond, O.L.
Whitaker, A.J.
Liu, S.F.
Phillips, D.
Retter, A.J.
Connolly, D.P.
Stewart, G.

Dataset CUSTODIAN
Geoscience Australia

Dataset JURISDICTION
Australia

Description ABSTRACT
The 1:1 million-scale `Geology of Western Australia¿ dataset has been compiled largely from the latest published 1:250,000 scale geological maps, augmented by more recent 1:100,000 scale and regional compilation maps. Most of Western Australia is covered by poorly consolidated Cenozoic regolith, mainly sand plains and dunes, lake deposits, and colluvium, with lesser silcrete, calcrete, and laterite.

Bedrock geological provinces in WA include the Pilbara Craton, Capricorn Orogen, Gascoyne Block, Northampton Complex, Hamersley/Ashburton Basins, and Carnarvon Basin in the west; Yilgarn Craton, Leeuwin Complex, and Perth Basin in the southwest; Albany ¿ Fraser Province and Bremer and Eucla Basins in the south; Musgrave, Arunta, and Granites ¿ Tanami Blocks and Birrindudu, Amadeus, and Officer Basins in the east; Halls Creek Province and Kimberley, Ord, Bonaparte, and Canning Basins in the north; and the Paterson Province and Proterozoic basins of the Bangemall region (Yerrida, Bryah, Padbury, Earaheedy, Scorpion, Edmund, Collier, Salvation basins) in the centre.

The oldest rocks, in the northwest Yilgarn Craton, are gneisses formed by metamorphism of igneous felsic to mafic crust (3.7-3.5 Ga), accompanied by smaller amounts of sedimentary rocks of igneous derivation. These formed probable basement to extensive greenstone sequences (3.7-2.5 Ga) that were intruded by voluminous granites at 3.5-2.6 Ga (Pilbara and Yilgarn Cratons). The junction of these two regions became a locus for extensive basaltic volcanism, followed by shallow-water clastic, carbonate, and iron sedimentation (Hamersley/Ashburton Basins; 2.55-2.4 Ga). Subsequent collision of the Pilbara and Yilgarn Craton deformed the volcanic and sedimentary rocks, forming the Capricorn Orogen/Gascoyne Craton (2.0-1.6 Ga). The Paterson Province (1800-750 Ma) overlies these regions, and consists of strongly metamorphosed sedimentary and volcanic rocks and granites, overlain by weakly metamorphosed sedimentary rocks intruded by granite. The Northampton and Leeuwin Complexes (Pinjarra Orogen; 2000-650 Ma) are parts of a belt of high-grade metasedimentary and granitic rocks along the western side of the Yilgarn Craton.

Similar processes took place elsewhere in Western Australia. In the north, the Halls Creek Province of strongly deformed and metamorphosed sedimentary and igneous rocks wraps around a less deformed buttress of thick shallow-water sediments of the Kimberley Basin (1800-670 Ma) that rest on unexposed basement. In the east, the Musgrave (1600-1000 Ma), Arunta (1880-350 Ma), and Granites ¿ Tanami Blocks consist of metasedimentary and meta-igneous rocks that became basement to younger basins such as the Birrindudu Basin (1800-200 Ma), and Amadeus and Officer (830-350 Ma) Basins. The pattern is similar elsewhere, with sags or rifts on and between cratons or orogens being filled with sedimentary and lesser

amounts of volcanic rocks in the Bangemall region (1600-1100 Ma), Bonaparte and Ord Basins (580-20 Ma), Canning Basin (460-0 Ma), Carnarvon and Perth Basins (420-0 Ma), Eucla Basin (150-0 Ma), and Bremer Basin (~50 Ma). The Albany-Fraser Province (1300-1100 Ma) differs somewhat from this pattern, in that it was a zone of tectonic reworking and metamorphism of the Yilgarn Craton, accompanied by emplacement of large masses of mafic and felsic igneous rock.

Description SEARCH WORD(S)
GEOSCIENCES Geology

Description GEOGRAPHIC EXTENT NAME(S): CODE(S)
WESTERN AUSTRALIA: WA

Description GEOGRAPHIC BOUNDING BOX
N_LAT: -13.5
S_LAT: -35.5
E_LONG: 129
W_LONG: 112.5

Description GEOGRAPHIC EXTENT POLYGON(S)
112.5 -13.5, 129 -13.5, 129 -35.5, 112.5 -35.5, 112.5 -13.5

Data Currency BEGINNING DATE
27NOV2008

Data Currency ENDING DATE
current

Dataset Status PROGRESS
Complete

Dataset Status MAINTENANCE AND UPDATE FREQUENCY
As required

Access STORED FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access AVAILABLE FORMATS

Digital/Non-Digital	Description
DIGITAL	ArcGIS-coverage ArcInfo coverage Geographic GDA94 GRS80
DIGITAL	shp ArcView shape file Geographic GDA94 GRS80

Access ACCESS CONSTRAINT
Subject to terms and conditions outlined in license.txt file.

Data Quality LINEAGE
Most data was sourced from the most recent published 250K scale geological maps from the Geological Survey of WA or Geoscience Australia. Where these maps were not current, available 100K geological maps or 500K regional compilation maps from GSWA and Geoscience Australia were used. Linework was generalised from the source maps for presentation at 1:1 million scale.

Data Quality POSITIONAL ACCURACY
This data has a nominal scale of 1:1,000,000. Positional accurracy of linework vaires between 200 and 1000m based on the scale and heritage of the source maps.

Data Quality ATTRIBUTE ACCURACY
All polygons are fully attributed with geological unit name hierarchy according to the Australian Stratigraphic Index and feature level metadata according to the Geoscience Australia digital data dictionary. All linework is attributed with geological attributes (ie: geological boundary, fault, water boundary) and feature level metadata according to the Geoscience Australia digital data dictionary. A geoscientist visually inspected the finished dataset to ensure the attributes were accurate and the data were consistent spatially with current scientific information. Data Dictionary standard: Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01 (http://www.ga.gov.au/standards/datadict.jsp).

Data Quality LOGICAL CONSISTENCY
The Arc/Info coverage dataset has been built with no label errors or intersecting arcs. Data structure conforms to the Geoscience Australia standard for a geology dataset. QA tests were also carried out on these data for completeness, correct spatial representation, attribute accuracy, logical consistency and correctness, and where appropriate for compliance with Geoscience Australia's data dictionary. Data Dictionary standard: Geoscience Australia, Data Dictionary for GIS Products, Version 2007.01 (http://www.ga.gov.au/standards/datadict.jsp).

Data Quality COMPLETENESS
The geological information is complete within the bounding polygon. Systematic checks have been made of both unit and line information throughout the entire data set.

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Contact Information ELECTRONIC MAIL ADDRESS
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Metadata Date METADATA DATE
27NOV2008

Additional Metadata ADDITIONAL METADATA

It is recommended that these data be referred to as:

Stewart, A.J., Sweet, I.P., Needham, R.S., Raymond, O.L., Whitaker, A.J., Liu, S.F., Phillips, D., Retter, A.J., Connolly, D.P., Stewart, G., 2008
Surface geology of Australia 1:1,000,000 scale, Western Australia [Digital Dataset]
Canberra: The Commonwealth of Australia, Geoscience Australia.
http://www.ga.gov.au

Specialised Geographic Information System (GIS) software is required to view this data.

Descriptions of MAP_SYMB attribute field:
MAP_SYMB format = Drxy

1. D = unit age. Two letters may be used for units spanning for than one age periods.

Cainozoic	Cz
Quaternary	Q
Mesozoic	Mz
Cretaceous	K
Jurassic	J
Triassic	-R
Palaeozoic	Pz
Permian	P
Carboniferous	C
Devonian	D
Silurian	S
Ordovician	O
Cambrian	-C
Proterozoic	-P
Neoproterozoic	N
Mesoproterozoic	M
Palaeoproterozoic	L
Archaean	A

2. r = gross rock descriptor. A one letter code to reflect the broad lithological composition of the unit

IGNEOUS	**EXAMPLES**
g felsic to intermediate intrusive	granite, granodiorite, tonalite, monzonite, diorite, syenite
d mafic intrusive	gabbro, dolerite, norite
f felsic extrusive / high level intrusive	rhyolite, dacite, ignimbrite, pyroclastic rocks
a intermediate extrusive / high level intrusive	andesite, trachyte, latite, pyroclastic rocks
b mafic extrusive / high level intrusive	basalt, scoria, shoshonite, pyroclastic rocks
u ultramafic undivided (intrusive & extrusive)	komatiite, high Mg basalt, pyroxenite, dunite, wehrlite
k alkaline ultramafic	kimberlite, lamprophyre, carbonatite

SEDIMENTARY

s siliciclastic/undifferentiated sediment shale, siltstone, sandstone, conglomerate, mudstone
j volcanogenic sediment epiclastic sediments and breccias, greywacke, arkose
l carbonate sediment limestone, marl, dolomite
c non-carbonate chemical sediment chert, evaporite, phosphorite, BIF
o organic-rich rock coal, amber, oil shale

MIXED SEDIMENTARY & IGNEOUS

v felsic & mafic volcanics
i felsic & mafic intrusives
w volcanics & sediments

METAMORPHIC

y low-medium grade meta clastic sediment slate, phyllite, schist, quartzite
t low-medium grade metabasite mafic schist, greenstone, amphibolite
r low-medium grade metafelsite rhyolitic schist, meta-andesite
m calc-silicate and marble meta carbonates and calcareous sediments
n high grade metamorphic rock gneiss, granulite, migmatite
p high-P metamorphic rock eclogite, blueschist
h contact metamorphic rock hornfels, spotted slate
e metamorphosed ultramafic rocks serpentinite, talc schist, chlorite schist (no feldspars), tremolite schist, ultramafic amphibolite

OTHER

z fault / shear rock mylonite, fault breccia, cataclasite, gouge
q vein quartz vein, carbonate vein
x complex, melange, undivided, unknown

3. xy = One or two letters to reflect the stratigraphic name of a unit. Where practical, these letters reflect stratigraphic grouping or hierarchy. For instance, formations within a named group should have letter symbols reflecting their parent group.

eg: Tomkinson Creek Group - Lsk
Bootu Formation - Lskb

End of file ...