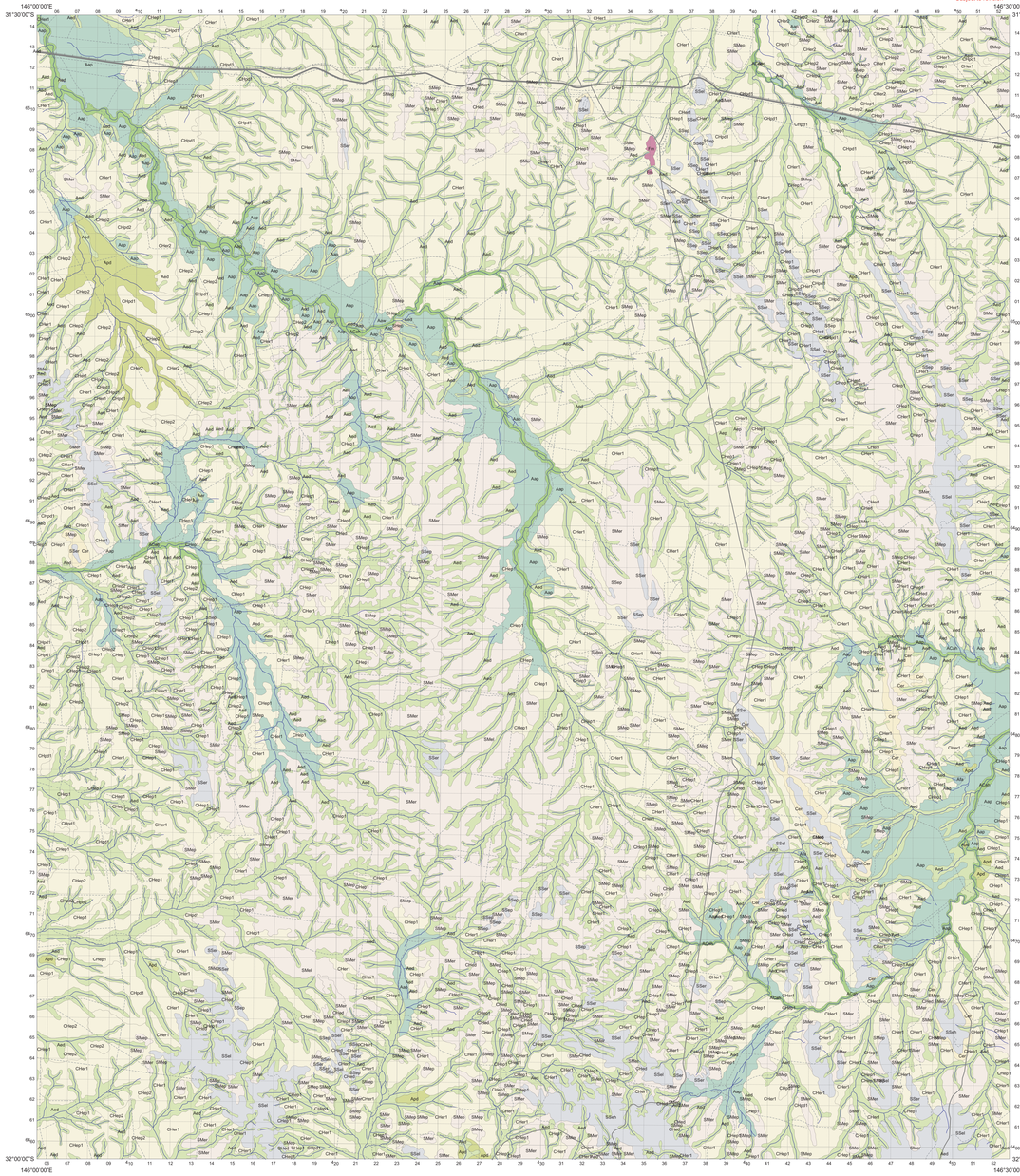
Scale 1:100,000

CANBELEGO REGOLITH-LANDFORMS

FIRST EDITION
Subject to revision

146°00'00"E — 146°30'00"E — 31°30'00"S — 32°00'00"S



Sealed highway
Unsealed secondary road
Vehicle track
Railway
Drainage line

0 5 10 km

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
Datum: Geocentric Datum of Australia 1994
Map Grid of Australia Zone 55

Horizontal coordinates on this map are based on the Geocentric Datum of Australia 1994 (GDA94) and the Map Grid of Australia (MGA). To convert GDA geographical coordinates to AGD66/AGD84 (about 10 m accuracy) add 5.58" to latitude (S) and subtract 4.38" from longitude (E). For UTM grid coordinates (from MGA to AMG66/AMG84) subtract 184 m from Northing and subtract 113 m from Easting.

TRANSPORTED REGOLITH

Alluvial sediments

Asp — Dominated by red-brown fine sand and silt with weakly to moderately ferruginised, sub-angular to rounded quartzose and lithic gravel and minor to major subangular to well rounded ferruginous gravel lag. Low relief horizontal to gently sloping undulating plain with minor drainage channels. Colonised dominantly by woodlands variously of *Eucalyptus intertexta*, *Eucalyptus populnea*, *Eremophila mitchellii*, *Geijera parviflora*, grasses, forbs and *Sclerolaena sp.*

Aaw — Dominated by red-brown fine sand and silt and clays with minor weakly ferruginised, subangular to rounded quartzose and lithic gravel and subangular to well rounded ferruginous gravel lag. Low relief, undulating, low-lying drainage depression. Colonised dominantly by open woodland of *Eucalyptus populnea*, grasses, forbs and *Sclerolaena sp.*

ACah — Dominated by red-brown fine silt and sand with scattered weakly to moderately ferruginised, angular to rounded quartzose and lithic gravel and cobbles with minor to major subangular to well rounded ferruginous gravel lag. Round- or flat-bottomed, broad, low gradient drainage depressions up to several hundred m width and < 10 m depth with discrete banks, seldom with a wide sandy channel or braided channels tens of m wide and < 2 m deep in the base. Colonised dominantly by woodland of *Eucalyptus populnea* and *Geijera parviflora*, grasses, forbs and *Sclerolaena sp.* in the channel base and as a riparian woodland.

Aed — Dominated by red-brown fine sand and silt with weakly to moderately ferruginised, subangular to subrounded quartzose and lithic gravel and minor to major subangular to well rounded ferruginous gravel lag. Broad drainage tracts up to 1000 m wide with very subdued relief, with flat or concave, low gradient bases. Colonised dominantly by woodland variously of *Callitris glaucophylla*, *Eucalyptus populnea*, *Eucalyptus intertexta*, *Eremophila mitchellii*, *Geijera parviflora*, *Acacia colletioides*, *Dodonea cuneata* and *Acacia excelsa* with rare *Sarcostemma viminale*, *Brachychiton populneus*, grasses, forbs and *Sclerolaena sp.*

Aep — Dominated by rounded to well rounded, variably sorted, weakly to moderately ferruginised, quartzose and lithic gravel and cobbles with minor red-brown fine sand and silt and minor angular to well rounded ferruginous gravel lag. Variably indurated by silica. Low relief (< 9 m) landforms, locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland of *Casuarina pauper, Eremophila mitchellii* and *Geijera parviflora*, grasses, forbs and *Sclerolaena sp.*

Aar — Dominated by rounded to well rounded, variably sorted, weakly to moderately ferruginised, quartzose and lithic gravel and cobbles with minor red-brown fine sand and silt and minor angular to well rounded ferruginous gravel lag. Variably indurated by silica. Slight relief (9-30 m) landforms locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland variously of *Eucalyptus socialis*, *Eucalyptus intertexta*, *Acacia decora* and scattered *Callitris glaucophylla*, *Acacia colletioides*, grasses, forbs and *Sclerolaena sp.*

Afa — Dominated by red-brown fine sand and silt with minor to moderate, weakly to moderately ferruginised, subangular to rounded quartzose and lithic gravel and cobbles and minor subangular to well rounded ferruginous gravel lag. Low to slight topographic relief (< 9 m) fans including distributary channels and sheetflow outwash downstream of intersection points. Colonised dominantly by woodlands of *Eucalyptus populnea*, grasses, forbs and *Sclerolaena sp.*

Apd — Dominated by red-brown fine sand and silt with weakly to moderately ferruginised, sub-angular to rounded, quartzose and lithic gravel and minor to major subangular to well rounded ferruginous gravel lag. Smooth, low relief (< 9 m) landforms typically associated with intersection point floodouts of alluvial channels and drainage depressions. Colonised dominantly by woodland variously of *Eucalyptus populnea*, *Eucalyptus intertexta*, *Eremophila mitchellii*, *Acacia excelsa*, *Geijera parviflora* and scattered *Acacia homalophylla*, *Brachychiton populneus*, *Apophyllum anomalum*, *Pittosporum phillireoides*, grasses, forbs and *Sclerolaena sp.*

Colluvial sediments

Cer — Dominated by angular to subangular, weakly to moderately ferruginised, quartzose and lithic gravel, cobbles and boulders with minor red-brown fine sand and silt and minor angular to well-rounded ferruginous gravel lag. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles occur in gullies. Slight topographic relief (9-30 m) slopes flanking higher relief landforms, shedding sediment into flanking channels, drainage depressions and plains. *Colonised dominantly by woodland variously of Eucalyptus intertexta, Eucalyptus populnea, Eucalyptus socialis, Callitris glaucophylla, Geijera parviflora, Acacia doratoxylon, Acacia decora, Dodonea cuneata* and scattered *Acacia rigens, Brachychiton populneus*, grasses, forbs and *Sclerolaena sp.*

CHed — Dominated by angular to subangular quartzose and lithic gravel, cobbles and boulders with minor red-brown fine sand and silt and minor angular to well rounded ferruginous gravel lag. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles in gullies. Elongate incised depressions and valleys between higher relief landforms. Colonised dominantly by woodland variously of *Eucalyptus populnea, Callitris glaucophylla, Geijera parviflora, Eremophila mitchellii, Dodonea cuneata*, grasses, forbs and *Sclerolaena sp.*

CHet1 — Dominated by weakly to moderately ferruginised, angular to subangular quartzose and lithic gravel, cobbles and boulders with minor red-brown fine sand and silt and angular to subangular ferruginous sand lag. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles. Moderate topographic relief (30-90 m) landforms, shedding sediment. Colonised dominantly by woodland variously of *Eucalyptus populnea, Eucalyptus intertexta, Eucalyptus socialis, Casuarina pauper, Acacia excelsa, Acacia aneura, Acacia decora, Acacia homalophylla, Eremophila mitchellii, Geijera parviflora, Dodonea sp.* and rare to scattered *Callitris glaucophylla, Hakea leucoptera, Brachychiton populneus, Acacia pendula, Alectryon oleifolius, Apophyllum anomalum, Capparis mitchellii*, grasses, forbs and *Sclerolaena sp.*

CHep1 — Dominated by red-brown fine sand and silt with weakly to moderately ferruginised, subangular to subrounded quartzose and lithic gravel and cobbles and minor subangular to well rounded ferruginous gravel lag. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles. Low-relief (< 9 m) landforms, low gradient, locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland variously of *Eucalyptus populnea, Eucalyptus intertexta, Eucalyptus socialis, Casuarina pauper, Acacia excelsa, Acacia aneura, Acacia decora, Acacia homalophylla, Eremophila mitchellii, Geijera parviflora, Dodonea sp.* and rare to scattered *Callitris glaucophylla, Hakea leucoptera, Brachychiton populneus, Acacia pendula, Alectryon oleifolius, Apophyllum anomalum, Capparis mitchellii*, grasses, forbs and *Sclerolaena sp.*

CHep2 — Dominated by red-brown fine sand and silt and subangular to well rounded ferruginous gravel with minor weakly to moderately ferruginised, subangular to subrounded quartzose and lithic gravel and cobble lag. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles. Low-relief (< 9 m) landforms, low gradient, locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland variously of *Eucalyptus populnea, Eucalyptus intertexta, Eucalyptus socialis, Casuarina pauper, Acacia excelsa, Acacia aneura, Acacia decora, Acacia excelsa, Acacia homalophylla, Eremophila mitchellii, Geijera parviflora, Dodonea sp.* and rare to scattered *Callitris glaucophylla, Hakea leucoptera, Brachychiton populneus, Acacia pendula, Alectryon oleifolius, Apophyllum anomalum, Capparis mitchellii*, grasses, forbs and *Sclerolaena sp.*

CHet1 — Dominated by weakly to moderately ferruginised, angular to subangular, quartzose and lithic gravel, cobbles and boulders with minor red-brown fine sand and silt and minor angular to well-rounded ferruginous gravel lag. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles. Slight relief (9-30 m) landforms, locally shedding sediment. Colonised dominantly by woodland variously of *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta, Eucalyptus socialis, Casuarina pauper, Eremophila sp., Acacia colletioides, Acacia decora, Dodonea sp., Senna artemisioides* and rare *Apophyllum anomalum, Alectryon oleifolius, Pittosporum phillireoides, Brachychiton populneus, Bossiaea walkeri*, grasses, forbs and *Sclerolaena sp.*

CHer2 — Dominated by weakly to moderately ferruginised, angular to subangular, quartzose and lithic gravel, cobbles and boulders with angular to well-rounded ferruginous gravel lag and minor red-brown fine sand and silt. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles. Slight relief (9-30 m) landforms, locally shedding sediment. Colonised dominantly by woodland variously of *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta, Eucalyptus socialis, Casuarina pauper, Eremophila sp., Acacia colletioides, Acacia decora, Dodonea sp., Senna artemisioides* and rare *Apophyllum anomalum, Alectryon oleifolius, Pittosporum phillireoides, Brachychiton populneus*, grasses, forbs and *Sclerolaena sp.*

CHpd1 — Dominated by red-brown fine sand and silt with minor subangular to subrounded quartzose and lithic gravel and minor angular to well-rounded ferruginous gravel lag. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles occur in gullies. Low-relief (< 9 m) landforms, with surficial contour band patterns and receiving sediment. Colonised dominantly by woodland variously of *Eucalyptus populnea, Eucalyptus intertexta, Eremophila mitchellii, Acacia excelsa, Geijera parviflora* and scattered *Acacia homalophylla, Brachychiton populneus, Apophyllum anomalum, Pittosporum phillireoides*, grasses, forbs and *Sclerolaena sp.*

CHpd2 — Dominated by red-brown fine sand and silt and subangular to well-rounded ferruginous gravel with minor weakly to moderately ferruginised, subangular to subrounded quartzose and lithic gravel and cobble lags. Minor exposures of weakly to moderately weathered bedrock with ferruginous mottles occur in gullies. Low-relief (< 9 m) landforms, with surficial contour band patterns and receiving sediment. Colonised dominantly by woodland variously of *Eucalyptus populnea, Eucalyptus intertexta, Eremophila mitchellii, Acacia excelsa, Geijera parviflora* and scattered *Acacia homalophylla, Brachychiton populneus, Apophyllum anomalum, Pittosporum phillireoides*, grasses, forbs and *Sclerolaena sp.*

Fill

Fm — Chaotic assemblage of regolith materials surrounding the Canbelego Mine site. Irregular landforms mostly consisting of mining waste dumps. Colonised dominantly by remnant native species and introduced woody weeds.

IN SITU REGOLITH

Saprolite

SHsp — Soft, variably ferruginised kaolinitic bedrock and quartz veins with opening joints filled with red-brown fine sand and silt with minor angular to rounded ferruginous gravel lag. Low-relief (< 9 m) landforms, low gradient, locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland variously of *Eucalyptus intertexta, Eucalyptus populnea, Eremophila mitchellii* with stands of *Casuarina pauper.*

SMel — Moderately hard kaolinitic and/or quartzose weathered bedrock with prominent cleavage planes and minor quartz veins or tors and pavements. Slight surficial ferruginisation and minor red-brown fine sand and silt with angular ferruginous sand lag. Moderate topographic relief (30-90 m) landforms, locally shedding sediment into flanking channels, drainage depressions, rises and plains. Colonised dominantly by woodland variously of *Callitris glaucophylla* on hilltops with *Eucalyptus populnea, Eucalyptus intertexta, Acacia decora* and *Brachychiton populneus* on colluvial footslopes, grasses, forbs and *Sclerolaena sp.*

SMep — Moderately hard kaolinitic and/or quartzose weathered bedrock with prominent cleavage planes and minor quartz veins or tors and pavements. Slight surficial ferruginisation with minor red-brown fine sand and silt and minor angular to rounded ferruginous gravel lag. Low-relief (< 9 m) landforms, low gradient, locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland variously of *Callitris glaucophylla, Eucalyptus intertexta, Casuarina pauper, Geijera parviflora, Eucalyptus socialis, Acacia decora, Acacia homalophylla, Eremophila sp., Dodonea sp.* and scattered *Acacia excelsa, Hakea leucoptera* and *Alectryon oleifolius* with grasses, forbs and *Sclerolaena sp.*

SMer — Kaolinitic and/or quartzose weathered bedrock with prominent cleavage planes and minor quartz veins or tors and pavements. Slight surficial ferruginisation with minor red-brown fine sand and silt and minor angular to rounded ferruginous gravel lag. Slight relief (9-30 m) landforms, locally shedding sediment into flanking channels, drainage depressions and plains. Colonised dominantly by woodland variously of *Callitris glaucophylla, Eucalyptus intertexta, Casuarina pauper, Geijera parviflora, Eucalyptus socialis, Acacia decora, Acacia homalophylla, Eremophila sp., Dodonea sp.* and scattered *Acacia excelsa, Hakea leucoptera, Alectryon oleifolius*, grasses, forbs and *Sclerolaena sp.*

Saprock

SSeh — Hard bedrock and quartz veins comprising pavements, tors or blocky outcrop with minor ferruginised patches. Joints and fractures filled with minor red-brown fine sand and silt and minor angular ferruginous sand lag. High relief (90-300 m) landforms, locally shedding sediment into flanking channels, drainage depressions and plains. Colonised dominantly by woodland variously of *Eucalyptus populnea, Eucalyptus intertexta, Eremophila sp., Dodonea sp.*, grasses, forbs and *Sclerolaena sp.*

SSel — Hard bedrock and quartz veins comprising pavements, tors or blocky outcrop with minor ferruginised patches. Joints and fractured filled with minor red-brown fine sand and silt and minor angular ferruginous sand lag. Moderate topographic relief (30-90 m) landforms, locally shedding sediment into flanking channels, drainage depressions, rises and plains. Colonised dominantly by woodland variously of *Callitris glaucophylla* on hilltops with *Eucalyptus populnea, Eucalyptus intertexta, Acacia decora* and *Brachychiton populneus* on colluvial footslopes, grasses, forbs and *Sclerolaena sp.*

SSep — Hard bedrock and quartz veins comprising pavements, tors or blocky outcrop with minor ferruginised patches. Joints and fractured filled with minor red-brown fine sand and silt and minor angular to rounded ferruginous gravel lag. Low-relief (< 9 m) landforms, low gradient, locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland variously of *Eucalyptus intertexta, Eucalyptus populnea, Eucalyptus socialis, Casuarina pauper, Eremophila mitchellii, Callitris glaucophylla, Hakea leucoptera, Dodonea cuneata, Acacia decora, Acacia aneura*, grasses, forbs and *Sclerolaena sp.*

SSer — Hard bedrock and quartz veins comprising pavements, tors or blocky outcrop with minor ferruginised patches. Joints and fractured filled with minor red-brown fine sand and silt and minor angular to subrounded ferruginous gravel lag. Slight relief (9-30 m) landforms, locally shedding sediment into flanking channels and drainage depressions. Colonised dominantly by woodland variously of *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta, Eremophila mitchellii, Capparis mitchellii, Geijera parviflora, Acacia decora, Dodonea sp.*, grasses, forbs and *Sclerolaena sp.*

RLU codes for regolith materials depicted here are:

A	alluvial sediments
AC	alluvial channel sediments
C	colluvial sediments
CH	colluvial sheetflow sediments
F	fill
SS	slightly weathered bedrock (saprock)
SM	moderately weathered bedrock (saprolite)
SH	highly weathered bedrock (saprolite)

RLU codes for landforms used here are:

ah	alluvial channel
ap	alluvial plain (with numerous small drainage depressions, low relief)
aw	alluvial swamp (low relief)
ed	erosional drainage depression (variable relief)
ep	erosional plain (0-9 m relief)
er	erosional rise (9-30 m relief)
el	erosional low hill (30-90 m relief)
eh	erosional hill (90-300 m relief)
fa	alluvial fan (low relief)
m	man-made
pd	depositional plain (with no significant drainage depressions, low relief)

RLU modifier codes used here to reflect different dominant tag types:

1	Dominantly angular to subangular lithic gravel lag with minor angular to rounded ferruginous sand and gravel.
2	Dominantly rounded to well rounded maghemite gravel lag with minor angular to rounded lithic gravel and ferruginous sand lag.

Canbelego 1:100,000 regolith-landform map
Compiled by and cartography by Dr Ian C. Roach (CRC LEME/Australian National University).

It is recommended that this map be referred to as:
Roach I.C. 2008. Canbelego 1:100,000 regolith-landform map. Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME), Perth.

The regolith-landform units on this map are based on an interpretation of satellite imagery, airborne geophysical imagery and limited field mapping. It is the intention of this map to identify and characterise surface materials and landforms for land managers and minerals explorers.

Disclaimer
The user accepts all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from using any information or material contained in this map. To the maximum permitted by law, CRC LEME excludes all liability to any person arising directly or indirectly from using any information or material contained in this map.

Most information is digitised from 2.5 m ground pixel resolution SPOT images or is taken directly from digital track logs of hand-held GPS devices. A small proportion of information is taken from the New South Wales Department of Primary Industry's Discovery 2000 Cobar-Bourke data set. CRC LEME acknowledges the support of Cobar Management Pty. Ltd. in the production of this map.

CRC LEME is an unincorporated joint venture between the Australian National University, The University of Adelaide, The Curtin University of Technology, CSIRO Exploration and Mining, CSIRO Land and Water, Primary Industries and Resources South Australia, The New South Wales Department of Primary Industry and the Minerals Council of Australia, established and supported under the Australian Government's Cooperative Research Centres Program.

Copies of this map may be obtained from:
CRC LEME
c/o CSIRO Division of Exploration and Mining
PO Box 1130
Bentley WA 6102
http://crcleme.org.au/.

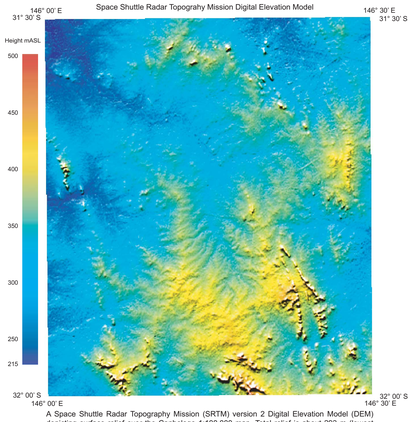
INDEX TO ADJOINING MAPS
1:100,000 shown in black
1:250,000 shown in **BLUE**

145° 30' E — 147° 00' E — 31° 00' S — 32° 00' S

Cobar 8035	Sussex 8135 **COBAR SI/55-14**	Coolabah 8235
Wrightville 8034	Canbelego 8134	Hermidale 8234
Lachlan Downs 8033	Nymagee 8133	Bobadah 8233

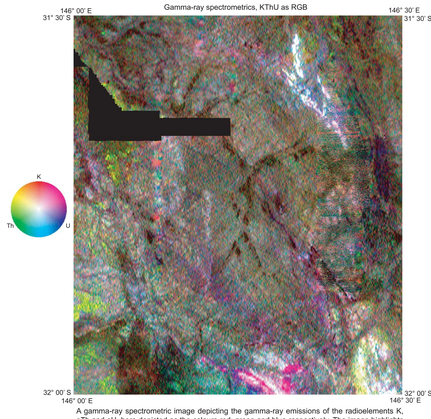
CRC AUSTRALIA
CRC LEME
Cooperative Research Centre for Landscape Environments and Mineral Exploration
THE AUSTRALIAN NATIONAL UNIVERSITY
CSA Mine

Space Shuttle Radar Topography Mission Digital Elevation Model



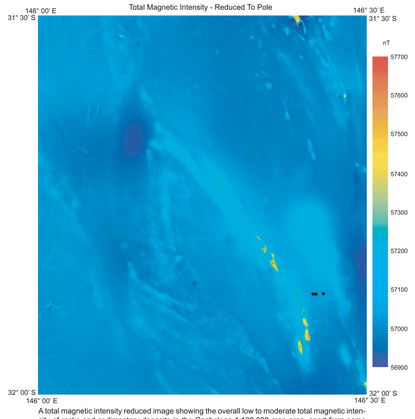
A Space Shuttle Radar Topography Mission (SRTM) version 2 Digital Elevation Model (DEM) depicting surface relief over the Canbelego 1:100,000 map. Total relief is about 293 m (lowest point: 214 mASL; highest point: 507 mASL). The topography is generally subdued apart from resistant bedrock ridges composed of sandstone, porphyry and granite of the Cobar Supergroup, Girilambone Beds or Nymagee Igneous Complex. Data courtesy of the United States Geological Survey.

Gamma-ray spectrometrics, KThU as RGB



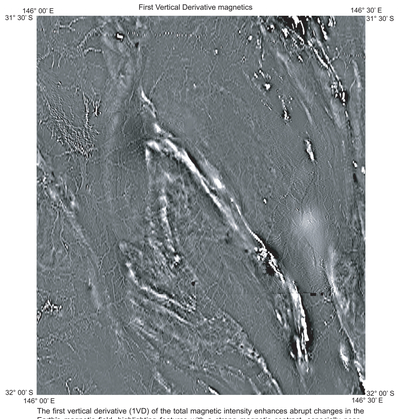
A gamma-ray spectrometric image depicting the gamma-ray emissions of the radioelements K, eTh and eU, here depicted as the colours red, green and blue respectively. The image highlights igneous bedrocks of the Cobar Supergroup (whites, yellows) and the Nymagee Igneous Complex (reds, whites) as well as weathered rocks of the Girilambone Beds (dull pink), ferruginous deposits (green) and quartz-rich deposits (black). Image courtesy of the NSW DPI.

Total Magnetic Intensity - Reduced To Pole



A total magnetic intensity reduced image showing the overall low to moderate total magnetic intensity of rocks and sedimentary deposits in the Canbelego 1:100,000 map area, apart from some small magnetic porphyry bodies associated with Cobar Supergroup rocks. Image courtesy of the NSW DPI.

First Vertical Derivative magnetics



The first vertical derivative (1VD) of the total magnetic intensity enhances abrupt changes in the Earth's magnetic field, highlighting features with a strong magnetic contrast, especially near-surface. This image shows folded and faulted weakly- to moderately-magnetic bedrocks overlain by dendritic drainage patterns related to ferruginous sediments being redistributed across the land surface. Modern drainage tends to be subdued whereas older paleochannel deposits are brighter, signifying they contain larger amounts of ferruginous material. Image courtesy of the NSW DPI.