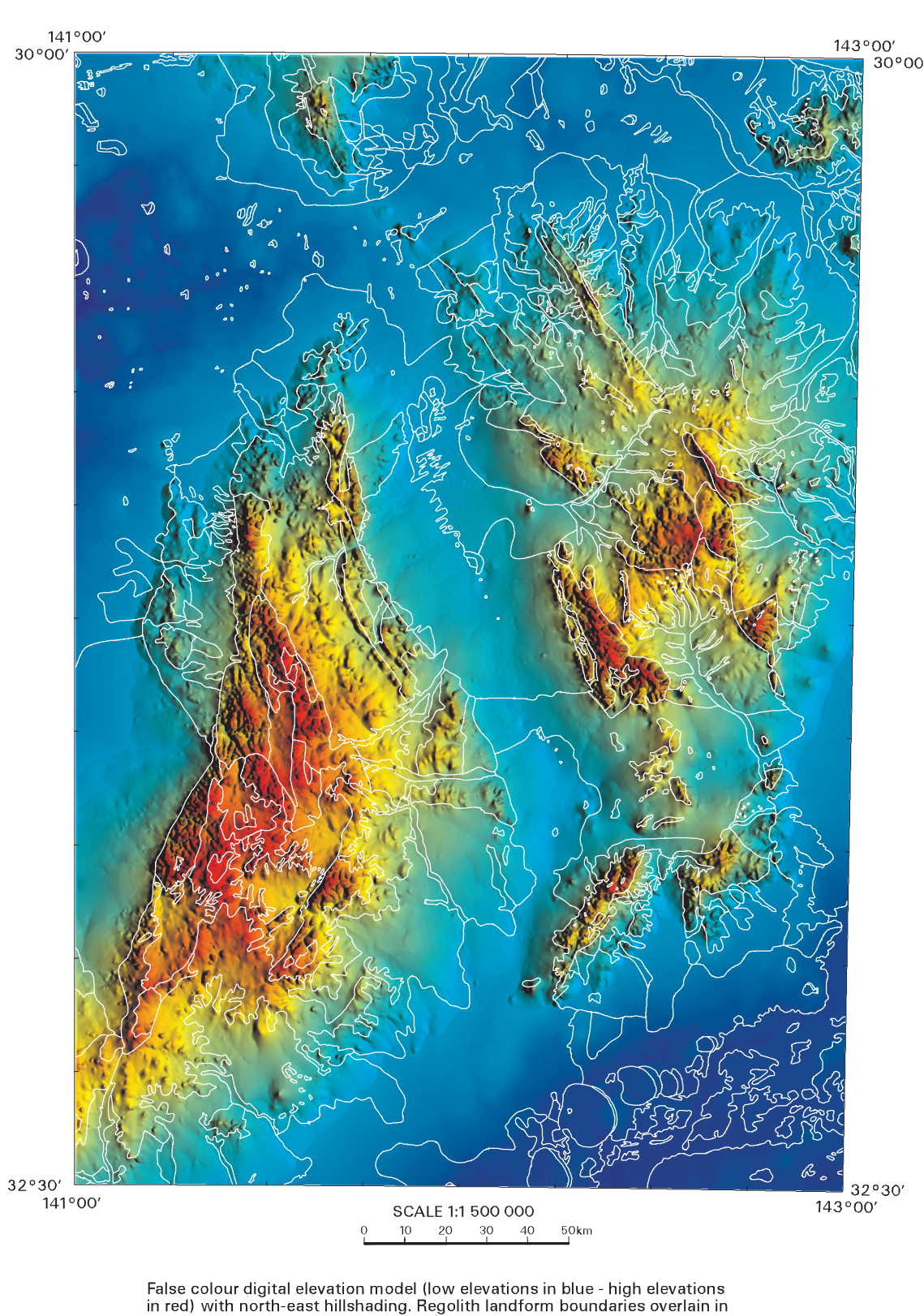


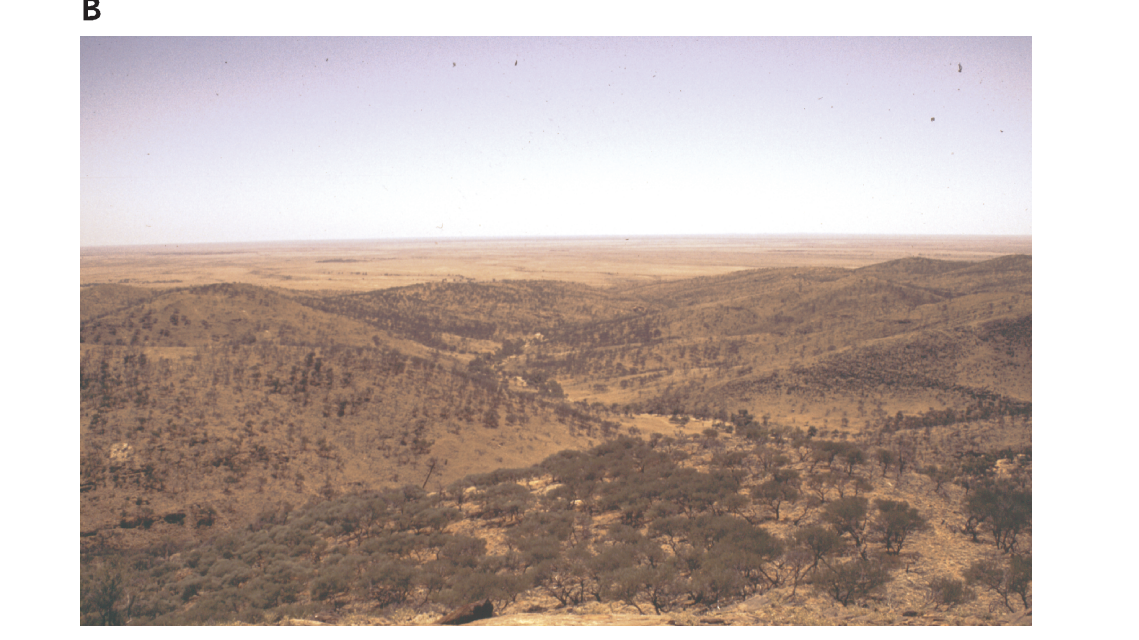
Regolith polygons draped over north-east hillshaded digital elevation model.



False colour digital elevation model. Low elevations in blue - high elevations in red - with north-east hillshading. Regolith landform boundaries overlain in white.

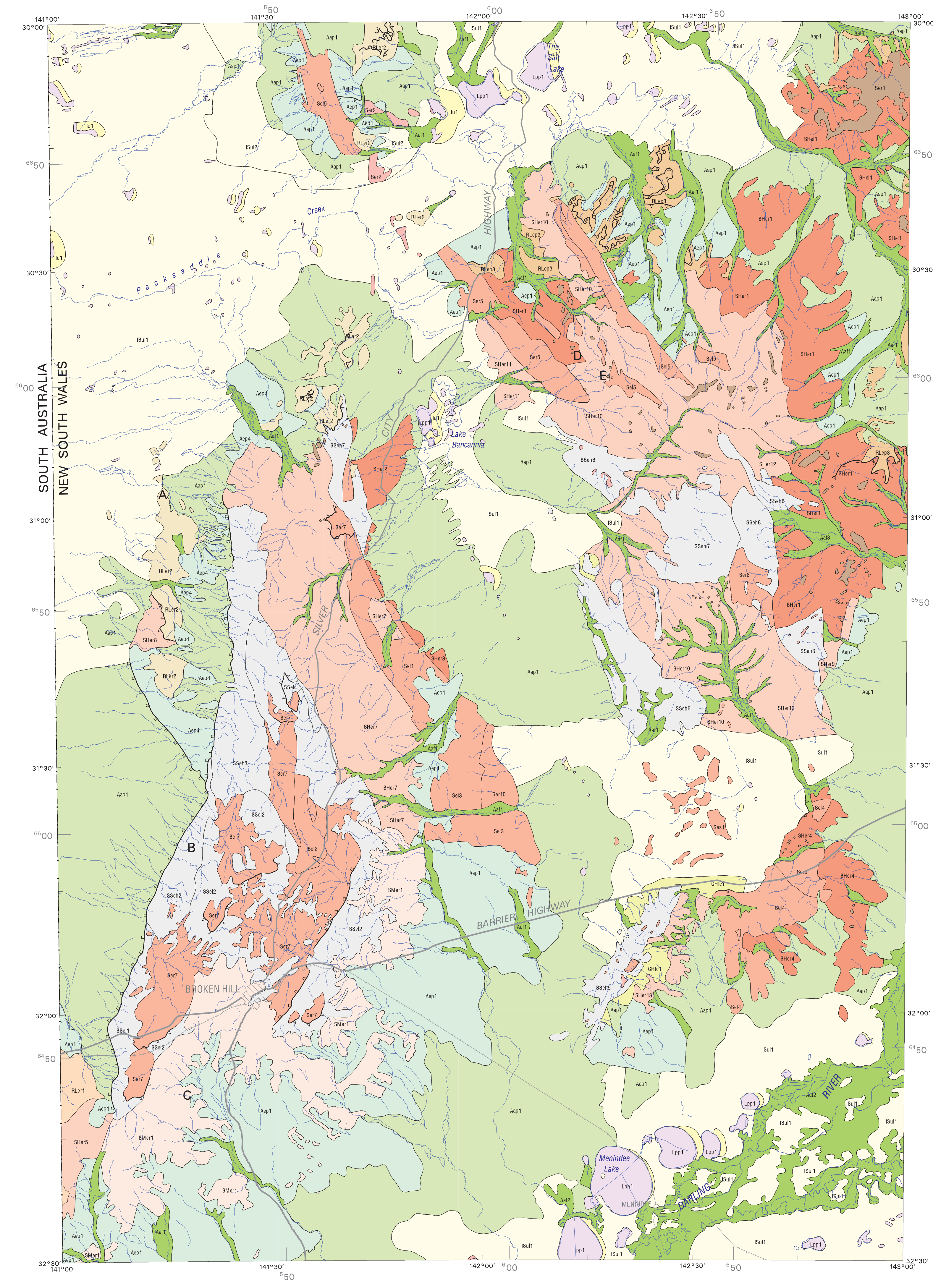


Small sand dune overlying silcrete gibber lag surface (RLst2), near Teila Station, 112 km N of Broken Hill.



Westward view from Mount Robe, 35 km NNW of Broken Hill, across dissected hills of slightly to moderately weathered metamorphics (S5eh2), to alluvial fans on the Mundi Mundi Plain (Aap1).

WARNING: Colour may deteriorate with prolonged exposure to light and moisture



Highly weathered high grade metamorphics exposed in an erosion scarp, 160 km WNE of Broken Hill. Photo by S.M. Hill (CRC LEME/ANU).



Steep rise of highly weathered Adelaidean (?) shale capped by silcrete developed in thin fluvial sediments, 160 km WNE of Broken Hill. Eroded fans on the Mundi Mundi Plain (Aap1).



Bleached and ferruginised Jurassic sandstone at the Three Hills, Wonaminta Station, 160 km WNE of Broken Hill. Flat-lying Jurassic sandstone capped by silcrete from the 50 m high hill in the background. Intervening plain consists of highly weathered Adelaidean (?) shale armoured with a lag of quartz pebbles and silcrete giggers, and approximates the exhumed Adelaidean - Jurassic unconformity surface.

BROKEN HILL REGOLITH LANDFORMS

TRANSPORTED REGOLITH

ALLUVIAL SEDIMENTS

Depositional landforms

- Aap1** Reddish-brown alluvial sand, silt, clay and gravel, calcareous in part, in broad floodplains and fans. Local aeolian sediment in longitudinal, transverse, and source-bounding dunes. Thickness variable, locally up to 250 m adjacent to Mundi Mundi Fault. Widespread through Broken Hill and Cumamona map areas.
- Aat1** Reddish-brown alluvial sand, silt, clay and gravel, calcareous in part, in channels and valley floodplains of seasonally active watercourses. Thickness variable, but generally < 5 m. Widespread through Broken Hill and Cumamona map areas.
- Aat2** Grey alluvial clay and silt in floodplain of the Darling River. Minor aeolian sand in longitudinal dunes. Southeast Broken Hill map area.
- Aat3** Alluvium derived from erosion of units S5eh8 and Ser8, in valley floodplains. Similar to unit Aat1, but has unique silica-rich Landsat TM response. Central east Broken Hill map area.

Erosional landforms

- Aap1** Reddish-brown alluvial sand, silt, clay and gravel, locally calcareous, in gently undulating treeless erosional plains with 'soutour' gullies, and widely spaced sediment-choked watercourses. A gravelly lag is generally present. Thickness up to 40 m, SE of Broken Hill, Broken Hill and Cumamona map areas.
- Aap4** Reddish-brown alluvial sand, silt, clay and gravel, locally calcareous, in gently undulating erosional treeless plains with 'soutour' gullies, and widely spaced sediment-choked watercourses. A gravelly lag is generally present. Sinuous low ridges capped with rounded pebbles and cobbles, low rises capped with silcreted mortared material of unknown origin overlying gypsiferous clay, and rises and low hills of slightly weathered basement saprolite are locally present. Central west Broken Hill map area.

AEOLIAN SEDIMENTS

Dune fields

- Isu1** Reddish-brown aeolian clayey sand in longitudinal dunes in varying stages of degradation, finer sediments in swales and small claypans between dunes. Broken Hill and Cumamona map areas.
- Isu2** Reddish-brown aeolian clayey sand in well developed longitudinal dunes, with small transverse dunes between these, with probable silt and clay in swales. Unit recognised entirely by photointerpretation. Northwest Broken Hill map area.

Lunettes and source-bounding dunes

- Isu1** Reddish-brown to white aeolian sand, silt, clay and locally gypsiferous in lunettes, source-bounding dunes, sand islands in large plays, and extensive transverse leeward mound systems downwind of claypans, playa lakes, and major old drainage lines in dune fields. Broken Hill and Cumamona map areas.

COLLUVIAL SEDIMENTS

Colluvial footslopes

- Chf1** Colluvial and alluvial sand and gravel in footslopes to nearby hills. Includes lag gravels, and at least two types of silcreted sediments around the Scopes Range. East Broken Hill map area.

LACUSTRINE SEDIMENTS

Claypans, playas, and permanent lakes

- Lp1** Grey lacustrine clay, silt, fine sand, and locally gypsum, in claypans, playas, and semi-permanent lakes. Broken Hill and Cumamona map areas.

IN SITU REGOLITH

LAG

Undifferentiated

- RLst1** Gravelly lag over highly weathered saprolite, in rises with contour gullies. Local outcrops of slightly weathered or ferruginised saprolite. Lag clasts include resistant bedrock lithologies, silcreted sediments, and ferruginous materials. South Cumamona and southwest Broken Hill map areas.

Silcrete Lag

- RLst2** Lag of clasts of silcrete (mostly formed in Mesozoic or younger rocks) and/or resistant older bedrock types, on rounded rises and low hills with 'soutour' gullies, separated by eroding areas of Mesozoic and older saprolite where the lag protected surface has been breached. Local outcrops of silcrete formed in sediments, Mesozoic rocks, and less commonly basement rocks. Northwest Broken Hill map area.

Ferruginous lag

- RLst3** Lag of ferruginised, and locally silcreted, saprolite, overlying highly weathered, partly ferruginised and/or mortared Mesozoic rocks in erosional plains, rounded rises, and low mesa-like landforms. Northeast Broken Hill map area.

WEATHERED ROCK

Mesozoic and younger rocks

Indurated rocks

- Ser1** Silcreted saprolite (mostly Mesozoic and younger) and sediments, typically forming a cap to mesas and plateaux, or large undulating surfaces. Also includes lag accumulations of silcrete clasts, especially where shown within unit RLst1. Broken Hill and Cumamona map areas.

Undifferentiated saprolite

- Ser2** Weathered Mesozoic sandstone in rises near the Mt Arrowsmith basement inlier. North Broken Hill map area.
- Ser3** Weathered Mesozoic rocks or Cainozoic sediments in eroded slopes at the western margins of claypans. Photointerpretation only. Broken Hill map area.
- S1** Weathered Mesozoic Rocks or Cainozoic sediments on isolated flat ridge tops on hills of Palaeozoic rocks, lacking breakaway edges usually associated with silcrete caps. Photointerpretation only. Eastern half of Broken Hill map area.

Highly weathered saprolite

- S1st1** Mostly highly weathered Mesozoic mudstone and sandstone in erosional rises and plains, overlain by a variety of thin surficial materials, locally including silcreted saprolite, and ferruginous and/or silcrete lag. Mudstones are generally bleached, and sandstones are locally highly ferruginised. North Broken Hill and Cumamona map areas.
- S1st2** Highly weathered Mesozoic sandstone, mudstone and conglomerate in rounded erosional rises with lag of silcrete fragments and clasts reworked from eroded conglomerate. North central Broken Hill map area.
- S1st3** Highly weathered east dipping Mesozoic sandstone, conglomerate and mudstone in covered sediments abutting hills of Devonian rocks. A veneer of lag, colluvium and alluvium covers the saprolite, which has been locally silcreted and ferruginised. Silcreted dipping beds form low strike ridges. Central Broken Hill map area.
- S1st4** Highly weathered, and in part ferruginised and silcreted, flat-lying Mesozoic sandstone, mudstone and conglomerate in erosional rises and plains. Southeast Broken Hill map area.
- S1st5** Highly weathered bleached Cretaceous rocks in low hills and slopes below silcrete plateaux. Northeast Broken Hill map area.



Compiled by D.L. Gibson and J.R. Willford (CRC LEME/AGSO), with contributions from S.M. Hill (CRC LEME/ANU), 1995. Revised by D.L. Gibson (CRC LEME/AGSO), 1998.

Cartography I.B. Harting (AGSO), 1995, L.M. Higher (AGSO), 1998.

It is recommended that this map be referred to as:

D.L. Gibson and J.R. Willford 1998 - Broken Hill Regolith Landforms (1:500,000 scale), Cooperative Research Centre for Landscape Evolution and Mineral Exploration, CRC LEME/AGSO/Perth/Canberra.

Regolith landform polygons based on interpretation of 1:50,000 panoramic aerial photographs and Landsat TM imagery, with limited field checking. This map provides a broad overview of regolith landforms around the Broken Hill area. Boundaries and polygon descriptions are generalised to show the main regolith type and physical processes.

Copies of this map may be obtained from:

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www: <http://leme.anu.edu.au/>

IN SITU REGOLITH (continued)

WEATHERED ROCK

Palaeozoic and Precambrian rocks

Undifferentiated saprolite

- S6p1** Weathered Palaeozoic sandstone in low relief areas near crest of Scopes Range, with a lag of locally derived rock fragments over red-brown swelling clay soils. Southeast Broken Hill map area.
- S6s5** Weathered late Neoproterozoic to early Palaeozoic metasediments and intercalated metabasalt in rises and low hills. Structural grain shows on air photos. Lag variable, with other fragments of vein quartz or metabasalt predominating. North central Broken Hill map area.
- S6s6** Weathered late Proterozoic to early Palaeozoic metasediments in rises and low hills. Structural grain shows on air photos in areas of higher relief. Northeast Broken Hill map area.
- S6s7** Weathered Precambrian rocks in broad, relatively flat flooded drainage basins forming erosional rises mostly surrounded by low hills and hills, but locally with scarp edges down to more dissected country. Alluvium and colluvium, calcareous in part, locally dominant. Broken Hill map area.
- S6s8** Weathered Mt Daubney Formation in undulating rises. Unique Landsat TM response indicates silica-rich soils. Central east Broken Hill map area.
- S6s9** Weathered Palaeozoic sedimentary rocks in rises and low hills, with small mesas and scarp-bounded sloping surfaces capped with in situ silcrete formed in sediment, and silcrete clast lag. Silcrete locally overlies gypsiferous clay. Southeast Broken Hill map area.
- S6s10** Weathered Devonian sandstone in rises, overlain by a variety of surficial transported regolith, including aeolian sand. Central Broken Hill map area.
- S6s11** Weathered Neoproterozoic metasediments in low hills and hills forming parallel strike ridges. Lag of angular fragments of quartzite or vein quartz, but locally includes fragments of silcrete formed in sediment, and rounded pebbles of quartzite and quartz. Central Broken Hill map area.
- S6s12** Weathered Neoproterozoic metasediments in low hills forming strike ridges; superimposed sinuous drainage. Lag mostly angular fragments of vein quartz. Southwest central Broken Hill map area.
- S6s13** Weathered Devonian sandstone in low hills with bedding generally not visible on air photos. Fluvial sediments and silcrete locally present. Local aeolian sand in longitudinal dunes. Central Broken Hill map area.
- S6s14** Weathered Palaeozoic rocks in low hills. Lag includes bedrock fragments and silcrete formed in sediments which include clasts of the underlying rock types. Southeast Broken Hill map area.
- S6s15** Weathered late Neoproterozoic to Early Palaeozoic metasediments in angular low hills and rises. Northeast Broken Hill map area.
- S6s1** Weathered Palaeozoic rocks in residual low hills. Aeolian sand in longitudinal dunes locally present. Central east Broken Hill map area.

Highly weathered saprolite

- S1st8** Highly weathered Precambrian metamorphics and metasediments in rises. Structure shows on Landsat imagery and air photos over much of the area. Southwest Broken Hill, south Cumamona map areas.
- S1st9** Highly weathered Neoproterozoic metasediments in rises, and local plains and low hills. Extensive lag of angular vein quartz. Central west Broken Hill map area.
- S1st8** Highly weathered Precambrian granite, metamorphics and metasediments in rises and low hills. Silcreted transported sediment and granite saprolite locally present. Multicomponent lag mostly present. Central west Broken Hill map area.
- S1st9** Highly weathered Devonian sandstone in rises with indistinct bedding trends on air photos. Central east Broken Hill map area.
- S1st10** Highly weathered late Neoproterozoic to early Palaeozoic metasediments in low rises. Bedding trends not visible on air photos. Extensive lag, mainly angular vein quartz. Northeast Broken Hill map area.
- S1st11** Highly weathered late Neoproterozoic to early Palaeozoic metasediments in dissected rises. Structure not visible on air photos. Aeolian sand in longitudinal dunes is locally present. North central Broken Hill map area.
- S1st12** Highly weathered Early Palaeozoic metasediments in low rises. Structure shows as poorly defined trends on air photos. Northwest Broken Hill map area.
- S1st13** Complex dissected area southeast of Scopes Range, with the topped ridges of highly weathered Palaeozoic metasediments and gypsiferous clay, capped with colluvial gravel. Lower ridges with the silcrete cappings formed in transported sediments overlying highly weathered bedrock also present. Southeast Broken Hill map area.

Moderately weathered saprolite

- S1st1** Moderately weathered Palaeoproterozoic metamorphics in rises, low hills and erosional plains. Topographically inverted transported sediments are locally present; in many places these have been cemented by silcreting or ferruginisation. Southwest Broken Hill map area.

Slightly weathered saprolite

- S5s1** Slightly weathered Palaeoproterozoic metamorphics in low hills and hills adjacent to the Mundi Mundi fault scarp. Southwest Broken Hill map area.
- S5s2** Slightly weathered Palaeoproterozoic metamorphics in low hills and hills. Central west Broken Hill map area.
- S5s4** Slightly weathered Palaeoproterozoic metamorphics in rises and low hills high in the local landscape. West central Broken Hill map area.
- S5s1** Slightly weathered Devonian sandstone in steep hills. Northeast Broken Hill map area.
- S5s2** Slightly weathered Palaeoproterozoic metamorphics in rugged dissected hills adjacent to Mundi Mundi Fault. Southwest Broken Hill map area.
- S5s3** Slightly weathered Neoproterozoic metasediments and Palaeoproterozoic metamorphics in hills adjacent to Mundi Mundi Fault. Central west Broken Hill map area.
- S5s4** Slightly weathered Precambrian rocks in deeply dissected hills with strong structural control. West central Broken Hill map area.
- S5s5** Slightly weathered Palaeozoic sedimentary rocks in hills of the Scopes Range. Southeast Broken Hill map area.
- S5s6** Slightly weathered Devonian sandstone in hills. East Broken Hill map area.
- S5s7** Slightly weathered Devonian sandstone in hills formed by post-Early Cretaceous tectonism. Northwest central Broken Hill map area.
- S5s8** Highly weathered Mt Daubney Formation in hills. Unique Landsat TM response indicating silica-rich soils. Central east Broken Hill map area.

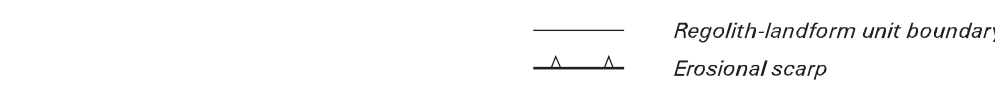
LANDFORMS

DEPOSITIONAL LANDFORMS

- ap alluvial plain
- at flood plain
- al low hill (30-50 m relief)
- ul dune fields
- lc colluvial fan
- pp plays plain

EROSIONAL LANDFORMS

- sp erosional plain (< 9 m relief)
- sr erosional rise (9-30 m relief)
- el low hill (30-50 m relief)
- eh hill (50-300 m relief)
- rs residual hill
- l plateau



UNIVERSAL TRANSVERSE MERCATOR PROJECTION
LATITUDE OF ORIGIN: 9° LONGITUDE OF ORIGIN: 141°

AMG grid ticks and values are shown in grey at 50 kilometre interval



CRCLME
Cooperative Research Centre for Landscape Evolution and Mineral Exploration

AGSO
Australian Geological Survey Organisation

BROKEN HILL
REGOLITH LANDFORMS
1:500 000 SPECIAL
REVISED MAP DECEMBER 1998
SUBJECT TO AMENDMENT