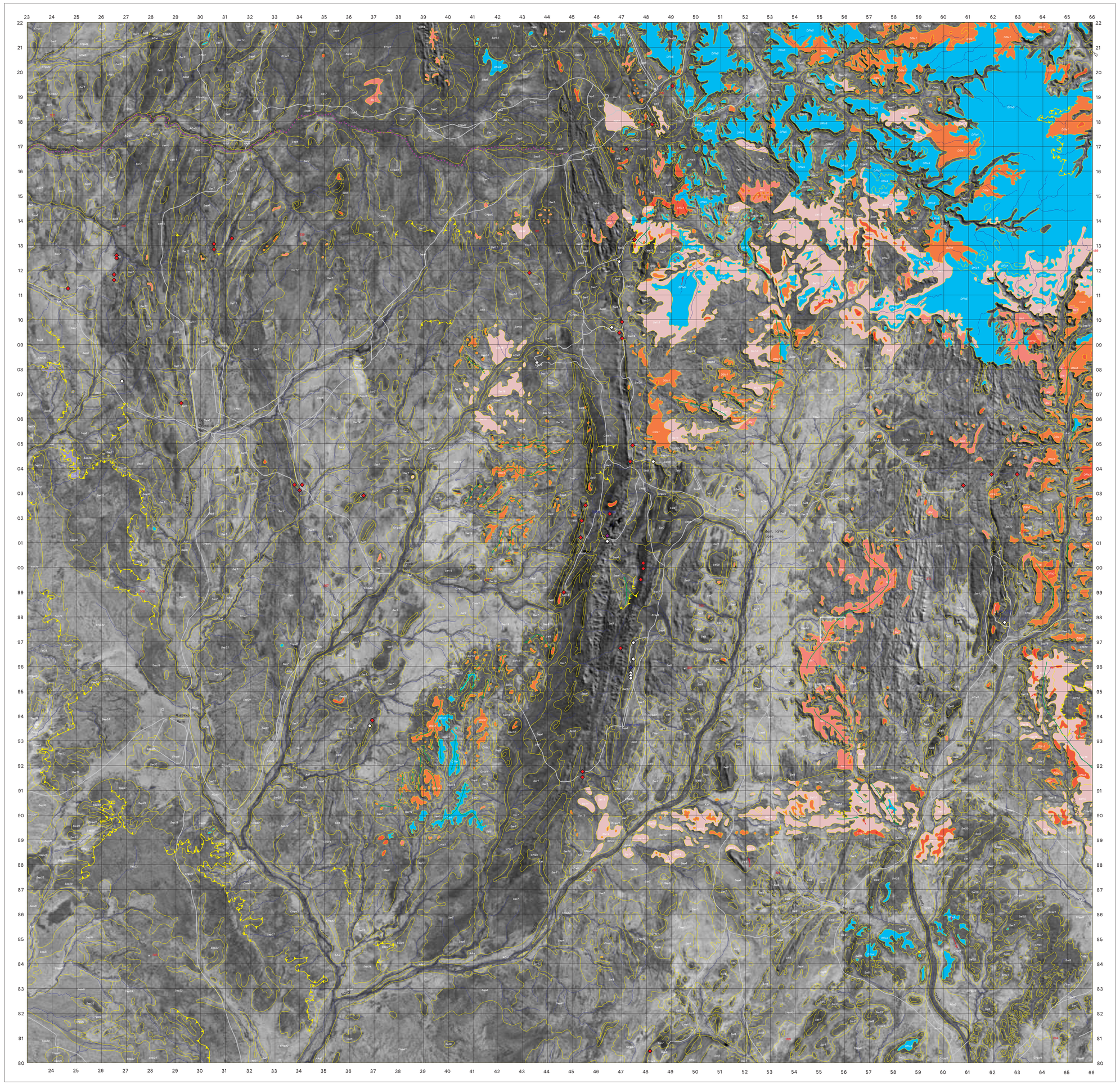
SELWYN Regolith - Landforms

Deeply weathered regolith over Landsat TM (band 5)



SCALE 1 : 65,000

2.5 0 2.5 5 7.5 10 km

UNIVERSAL TRANSVERSE MERCATOR
SPHEROID: AUSTRALIAN
ZONE 54

REGOLITH TYPES

Major bedrock type

Duricrust

Proterozoic bedrock

Ferruginous

Metamorphics — Dfls1 — *Massive and in places slabby Fe duricrust or collapsed ferruginous saprolite over mottled and bleached saprolite. Lags of lithic fragments, Fe duricrust gravels and pisoliths. Rods of Fe segregations in the mottled zone. Silicification of the saprolite is common and typically extends into the bleached zone with thicknesses to more than 10 metres. Plateaux, mesas and buttes.*

Dfls2 — *Massive block Fe duricrust over ferruginous and mottled saprolite. Lags of ferruginous lithic gravels, fragments of Fe duricrust and pisoliths. Rods of Fe segregations in the mottled zone. Duricrust is associated with massive stratigraphic hematitic beds. Minor cemented angular colluvial Fe gravels. Flat-top hills, minor plateaux.*

Granite — Dfls3 — *Massive and in places slabby Fe duricrust over ferruginous, mottled and bleached saprolite. Lags of ferruginous lithic gravels, fragments of Fe duricrust and pisoliths. Quartz sands. Rods of Fe segregations in the mottled zone. Silicification and intense bleaching of the underlying saprolite. Plateaux, mesas and buttes.*

Siliceous

Dfls4 — *Mottled silcrete, silicified and bleached saprolite. Upper part of the profile is iron-stained and mottled. Feldspars and micas weathered to clay (kaolinite) and iron oxides. Silicification and intense bleaching of the underlying saprolite commonly extends several 10s of metres. Minor Fe duricrust and highly ferruginous saprolite in places cemented quartz pebble outcrops. Plateaux, mesas and buttes.*

Mesozoic sediments — Dfse4 — *Massive Fe duricrust and highly ferruginous saprolite over mottled limgular to mega sub-circular) and in places bleached bedrock. Saprolite partly silicified. In places silcreted caps rather than Fe duricrusts have developed. The underlying Proterozoic bedrock is typically very highly weathered, mottled, bleached and in places silicified. Plateaux, mesas and buttes.*

Dfse5 — *Ferruginous saprolite with patches of massive Fe duricrust over mottled limgular to mega sub-circular) and in places bleached bedrock. Saprolite partly silicified. Lags of ferruginous lithic gravels, Fe duricrust fragments and pisoliths. Underlying Proterozoic bedrock is typically very highly weathered, mottled, bleached and in places silicified. Plateaux, mesas and buttes.*

Cambrian sediments — Dfsa2 — *Silicified, ferruginous and mottled saprolite. Re-cemented ferruginous and siliceous collasped saprolite common over plateau surface. Plateaux, mesas and buttes.*

Saprolite

Proterozoic bedrock

Metamorphics — Sa1 — *Silicified and bleached saprolite. Upper part of the profile which may or may not be present is iron-stained and mottled. Feldspars and micas weathered to clay (kaolinite) and iron oxides. Bleached zone is generally several 10s of metres thick and silicified. Minor Fe duricrust. Low hills, mesas, plateaux and dissected plateaux.*

Sa2 — *Partly silicified and weakly mottled bleached saprolite (several 10s of metres thick). The upper part of the profile is ferruginous and mottled. Saprolite partly covered by lithosols consisting of ferruginous/bleached lithic fragments, gravels and minor Fe duricrust nodules and pisoliths. Low hills, minor scarps and rises.*

Sap3 — *Ferruginous and mottled saprolite. Mottled zone overlies bleached saprolite. Partly covered by lags of ferruginous and silicified saprolite, quartz and lithic fragments. In places lags overlie bleached saprolite. Erosional plains.*

Sap4 — *Saprolite partly covered by lithosols and lags consisting of highly ferruginous saprolite fragments and lithic gravels. Upper part of the profile typically highly ferruginous. Highly dissected erosional plain (< 9m relief).*

Sap5 — *Highly weathered mottled saprolite covered by extensive veneers of residual gravelly soils and lags of ferruginous saprolite, quartz, lithic fragments and minor Fe pisoliths and ferruginous gravels. Residual clays generally < 1.0 meter thick. Minor alluvium along stream channels. Erosional plains (< 9m relief).*

Sap6 — *Saprolite partly covered by extensive veneers of polymictic gravel lags including ferruginous lithic and saprolite fragments, minor quartz, Fe pisoliths and ferruginous gravels. Lags are generally < 1.0 meter thick. Narrow tracts of alluvium along some stream channels. Erosional plains, minor pediments.*

Ser7 — *Mottled and ferruginous saprolite partly covered by lithosols and lithic lags consisting of ferruginous lithic fragments, quartz gravels with a red silt/clay matrix. Rises (9-30m relief).*

Sa88 — *Ferruginous and diffusely mottled saprolite partly covered by lithosols. Colluvial gravels are associated with fans and aprons flanking steeper slopes. Minor rises, sediment. Low hills (30-90m relief).*

Sah9 — *Saprock partly covered by lithosols and colluvium flanking steep hill slopes. Hills (90-120m relief).*

Sea10 — *Saprock partly covered by scree and lithosols. Weathering is variable ranging from highly weathered bleached and silicified bedrock to slightly weathered bedrock. Escarpment.*

Sa11 — *Fe-rich saprolite largely covered by veneers of Fe duricrust fragments, ferruginous lithic gravel lags and red clay soils, with minor Fe nodules. Erosional plains, minor pediments (< 9m relief).*

Ser12 — *Highly ferruginous and diffusely mottled saprolite. Saprolite partly covered by highly ferruginous lithic gravel lags and reddish orange clays/fine sands. Locally developed Fe duricrusts and Fe segregations. Rises, minor low hills (30-90m relief).*

Sa13 — *Highly ferruginous bedrock associated with stratigraphic hematitic beds. Saprolite partly covered by ferruginous gravel lags, beds lithosols and pockets of red clay soil over massive diffusely mottled hematitic bedrock. Low hills (30-90m relief) and stratiform ridges.*

Granite — Sa14 — *Highly ferruginous, mottled and bleached saprolite. Feldspars and micas weathered to clay (kaolinite) and iron oxides. Silicification and intense bleaching of the underlying saprolite common. Lags of ferruginous and silicified saprolite and quartz gravels. Minor Fe duricrust. Plateaux, mesas.*

Sa15 — *Ferruginous saprolite and mottled saprolite over bleached bedrock. In places silicification of the saprolite extends to the bleached zone. Most feldspars and micas weathered to clays and Fe oxides. Lithosols and gravel lags over saprolite. Low hills (30-90m relief) and minor scarps.*

Ser16 — *Upper part of the profile consists of ferruginous and mottled saprolite. At depth typically strongly bleached and partly silicified. Most of the soluble minerals in the upper part of the profile have weathered to clays (kaolinite) and Fe oxides with quartz as a resistate. Rises and mesas (9-30 metres relief).*

Sap17 — *Bleached granitic saprolite, partly covered by lithic lags, residual clay and sandy soil. Erosional plains (< 9m relief).*

Sap18 — *Granitic saprolite covered by extensive veneers (generally < 1m) of residual sands and gravel lags consisting of mica, quartz and feldspar sands; siliceous, ferruginous and bleached saprolite fragments, quartz and minor fragments of Fe duricrust. Local in-ser channel alluvium and sheet flow sediment of sand and gravel. Erosional plains (< 9m relief).*

Ser19 — *Upper part of the profile is ferruginous and diffusely mottled. About half of primary minerals (feldspars and micas) weathered to clays and oxides. Partly covered by gritty sands and lithic gravels. Rises (9-30m relief).*

Sa120 — *Upper part of the profile is ferruginous and diffusely mottled with most of the primary minerals (feldspars and micas) weathered to clays and oxides. Gravel scree and lithosols on steeper slopes. Minor iron channel alluvium and sheetflow colluvium. Low hills (30-90m relief).*

Sea21 — *Saprock partly covered by scree and lithosols. Weathering is variable ranging from highly weathered mottled, bleached and silicified bedrock to slightly weathered bedrock. Escarpment.*

Post-Proterozoic bedrock

Mesozoic sediments — Sap22 — *Ferruginous saprolite covered by a veneer of residual sands, clay and lags. Lags of highly ferruginous saprolite and lithic fragments. Minor siliceous lithic gravels. Erosional plains (< 9m relief).*

Ser23 — *Ferruginous and mottled saprolite, in places silicified, partly covered by lithosols and gravel lags. Rises (9-30m relief).*

Sap24 — *Ferruginous saprolite covered by residual sand, clay and lags. Saprolite is typically mottled and partly silicified. Lags of ferruginous lithic and Fe duricrust fragments, quartz pebbles and silcrete gravels in a reddish orange sandy to silty soil matrix. Erosional plains (< 9m relief).*

Sa125 — *Ferruginous and mottled saprolite and saprock. In places the saprolite is bleached and silicified. Partly covered by lithosols. Low hills (30-90m relief).*

Sea26 — *Saprock, Fe-stained and diffusely mottled saprolite. Partly covered by scree and lithosols. Escarpment.*

Cambrian sediments — Sap27 — *Ferruginous and mottled saprolite. Mostly covered by thin lithic gravel lags and lithosols. Erosional plains (< 3m relief) minor pediments.*

Sa128 — *Mottled and in places ferruginous and silicified saprolite. Partly covered by gravelly lithosols. Low hills (30-90m relief).*

Sap29 — *Ferruginous and mottled saprolite. Saprolite is covered by an extensive but thin blanket of gravel lags, consisting of ferruginous, lithic and Fe duricrust fragments, quartz pebbles, silcrete gravels and residual reddish orange sandy soils. Erosional plains (< 3m relief).*

Sap30 — *Saprolite largely covered by residual soils consisting of pale grey to brown silty clays and calcareous clays with minor calcareous lithic and chert lags. Erosional plains (< 3m relief).*

Sap31 — *Saprolite covered by extensive hard setting residual dull green to reddish brown clays, swelling gilgai soils and minor gravel lags. Erosional plains (< 3m relief).*

Ser32 — *Ferruginous and in places silicified saprolite mostly covered by thin stoney lithosols, lags and residual soils consisting of ferruginous saprolite, lithic fragments, chert, silcrete and residual clays. Rises (9-30m relief).*

Sea33 — *The upper part of the weathering profile typically ferruginous, mottled and partly covered by lithosols. Escarpment.*

Alluvial sediments

ACal — *Recent alluvium consisting of interbedded gravel, sand and clay with local lenes of unconsolidated cobble conglomerate. In places partly cemented by clay Fe or silica. Soils are reddish brown and grey sandy earths. Flood plains, channel floors.*

ACa0 — *Overbank and channel overflow deposits consisting mainly of sand, clay and minor gravels. Typically thin and overlie residual sands, clays and saprolite. Flood out and flood plains.*

AAal — *Alluvial terrace sediments consisting of interbedded sand, clay and gravel. In places truncated paleosols indicate several cycles of deposition, erosion and weathering. Soils are reddish brown mottled earths and duplex soils. Alluvial terraces.*

Aaf — *Undifferentiated alluvial channel and overbank sediments consisting of various proportions of clay, sand and gravel. Forms narrow tracts between rises, low hills and hills. Typically intermixed with minor colluvial footslope deposits adjacent to scarps, low hills and hills. Flood plains.*

Colluvial sediments

CHpd1 — *Sheet flow consisting of silty clay loam, clay and sand. Local cracking clay soils (gilgai micro-relief). Sediments typically > 1.5m thick and overlie very highly weathered and mottled saprolite. Extensive tags consist of ferruginous saprolite, lithic fragments and quartz with minor Fe duricrust fragments and Fe pisoliths. Minor alluvium. Depositional and erosional plains.*

CHpd2 — *Sheet flow and residual deposits consisting of various proportions of clay, sand and gravel. Local cracking clay soils (gilgai micro-relief). Typically < 1.5m thick and overlie very highly weathered and mottled saprolite. Extensive lags consist of ferruginous saprolite, lithic fragments and minor Fe duricrust fragments and Fe pisoliths. Minor alluvium. Depositional and erosional plains.*

CHei1 — *Sheet flow colluvial and minor alluvial deposits forming a veneer (generally < 3m thick) of sand, clay and gravel over mottled and typically bleached saprolite (mainly metamorphics). Gravelly lags are common and consist of ferruginous saprolite, quartz and lithic fragments. Pediments.*

CHei2 — *Sheet flow quartzose/feldspathic sand, clay and gravels (generally < 1m thick) derived from granitic saprolite. Gravelly lags consist of siliceous, ferruginous and bleached saprolite fragments, quartz and Fe duricrust fragments. Minor channel alluvium and residual sand. Pantselling tors common. Pediments and erosional plains.*

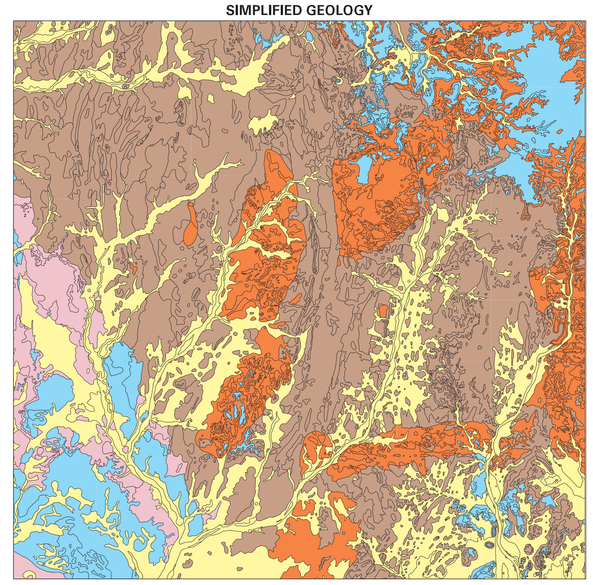
CHei3 — *Colluvial and alluvial clay, sand and gravel over ferruginous and mottled saprolite. Pediments.*

CHei4 — *Colluvial sheet flow sands and lags consisting of lithic fragments and ferruginous gravels over highly weathered Cambrian sediments (typically mottled and ferruginous). Minor alluvial sand and gravel. Pediments.*

CHfs1 — *Colluvial footslope gravel consisting of quartz, ferruginous saprolite and lithic fragments in a coarse sandy to gravelly earthy matrix. Footslopes.*

CHfs2 — *Colluvial footslope deposits consisting of highly ferruginous saprolite, Fe duricrust fragments, Fe pisoliths and lithic fragments in a ferruginous earthy matrix. Footslopes, minor pediments.*

SIMPLIFIED GEOLOGY



Mesozoic sediments: sandstone, siltstone, mudstone and conglomerate

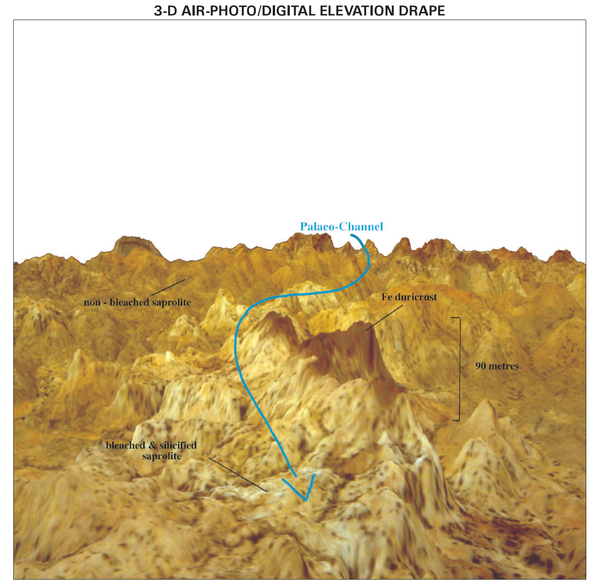
Cambrian sediments: siltstone, sandstone, limestone, chert, silicified shale and dolomite

Granitic bedrock: foliated and non-foliated biotite granite, hornblende-biotite granite, tonalite and granodiorite

Metamorphic bedrock: meta-siltstone, meta-arenite, amphibolite, meta-basalt, gneiss, schist, phyllite and quartzite

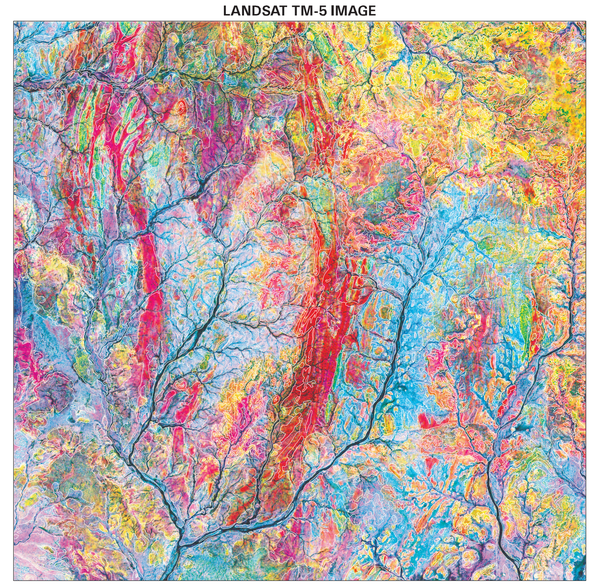
Colluvium and alluvium

3-D AIR-PHOTO/DIGITAL ELEVATION DRAPE



Some of the most intense weathering is associated with Pre-Mesozoic valleys floors as shown by the enhanced colour photograph/digital elevation model drape above. In many cases terrestrial Mesozoic sediments have been removed leaving behind partly silicified and bleached saprolite. This intense weathering of the bedrock is likely to be due to ground waters removing Fe and precipitating silica within saprolite beneath the valley floor. Fe duricrusts probably delineate the edge of the old river valley and have formed from the lateral movement of Fe steam palaeo slope. The location of this image on the regolith map is shown by the white box.

LANDSAT TM-5 IMAGE



False colour composite Landsat TM image (30m pixels) showing highly ferruginous saprolite and Fe duricrust in yellow-green; structured saprolite in red; vegetation black and vertical gravels in pale blue.

Regolith landform unit boundary
Erosional scarp
Paleo-drainage
Paleo-landform slope
Superimposed drainage
Drainage
Roads, vehicle tracks

*MINERAL OCCURRENCES (DEPOSITS) **
Gold
Silver
Copper
Cobalt
Uranium
Unspecified

* *Data provided by Bureau of Resource Science from MINDOC database*

REGOLITH CODES

Df	Ferruginous duricrust
Ds	Siliceous duricrust
K	Saprolith
AC	Channel deposits
AO	Overbank deposits
AA	Alluvial terrace deposits
Ca	Undifferentiated alluvium/residual
Cs	Sheet flow sediments
Cf	Footslope deposits

LANDFORM CODES

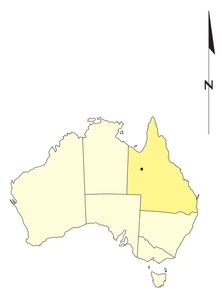
ls	Plateau
ei	Pediments
ep	Erosional plain (< 9m relief)
hr	Hills (90-120m relief)
sf	Low hills (30-90m relief)
eh	Hills (90-300m relief)
sc	Escarpment
af	Floodplain
ao	Floodout, overbank plain
ac	Channel alluvium
tc	Colluvial fan
pd	Depositional plain
aa	Alluvial plain

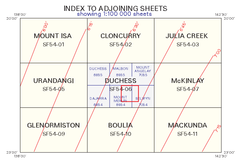
Metamorphic bedrock: Meta-siltstone, meta-arenite, amphibolite, meta-basalt, gneiss, schist, phyllite and quartzite.

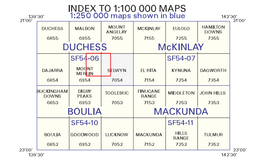
Granitic bedrock: foliated and non-foliated biotite granite, hornblende-biotite granite, tonalite and granodiorite.

Mesozoic sediments: Sandstone, siltstone, mudstone and conglomerate.

Cambrian sediments: Siltstone, sandstone, limestone, chert, silicified shale and dolomite.







River channel gravels cemented by silica over highly weathered, mottled and silicified granitic saprolite. Landform: Mesa (441307E, 7595801N)

Massive iron duricrust, highly ferruginous and mottled (in places silicified) saprolite (granite). Landform: Plateau edge (463911E, 7539416N)

Ferruginous and mottled Mesozoic sediments (sandstone, claystone and siltstone). Minor iron duricrust. Landform: Mesa (450528E, 7617984N)

Slabby iron duricrust and ferruginous saprolite over mottled and bleached saprolite (schist and phyllite). Landform: Mesa and flat topped ridges (464206E, 7601306N)

Protruding granite tors surrounded by coarse residual and locally derived sheet flow quartzose and micaceous sands. Landform: Erosional Plain and local rises (461552E, 7590887N)

Compiled by J.R Willford (CRC LEME,AGSO), 1996

Cartography by D.Bolinovski, D.Haquila, J.R Willford and P.Chavn (AGSO), 1996 Geographic Information Systems by D.Bolinoski and J.R Willford (AGSO), 1996

It is recommended that this map be referred to as: J.R Willford 1996 - Selwyn Regolith-Landforms Map. Cooperative Research Centre for Landscape Evolution and Mineral Exploration, (CRC LEME) Perth/Canberra

Regolith-Landforms polygons are based on interpretation of 1:25,000 colour ektrhotos, enhanced Landsat TM imagery, airborne gamma-ray imagery and field observations.

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