

Fe segregations, Fe-saprolite and Fe-stained hardpan.

Lag - variable composition but dominantly gravel-sized consisting of bedrock fragments

Calcrete - pods, slabs, blocky, and massive

Iron segregations in exposed saprolite, or concentrated at the surface.

Duricrust - nodular; iron rich; fragmental as single species or a mixture

Lag-gravels: dominantly sandy quartzofeldspathic, or quartzofeldspathic

Hardpan - either dominantly siliceous cement and iron stained;

Extensive playa floors consisting of clay gypsum and hallte

(Greenstone Bedrock)

Sheet flow fan

Playa plain Sandplain

Depositional plain

Erosional landforms

Erosional plain

Pediplain Etchplain

Residual rises

Escarpment

Rises

Low hills

Hills

eh

ee

EROSIONAL LANDFORMS

MINERAL OCCURRENCE

(Data provided by Bureau of Resource Sciences from the MINLOC database)

Transported regolith Alluvial sediments Sediments consisting of levee deposits, some broad channel alluvial deposits up to 15m thick. Hardpan extensive within 2m of the surface; some fine granule quartzo-feldspathic lag; some granite saprolite as substrate. Sediments consisting mainly of sheet flow deposits with minor bedload stringers. Pale clays often saprolitic substrate at 2 - 4m. Rare greenstone outcrop but forms part of bedrock sequences. Dark brown to black granule lag is extensive over a broadly convex to flat, gently inclined plain. Alluvium consisting of sandy clays merging to stony sands and occurring in terraces associated with nearby active shallow tributary channels. Sandy red earths and red earths developed in alluvium which become stony at about 0.5m and give way to hardpan at 1m. Overbank deposits Alluvial clay loams and light clays with some bands and lenses of coarse stream-bed deposits. A few lenses of calcrete with extensive hardpan development at 0.75m. Sediments are primarily derived from greenstone sources and are intermixed with the distal portions of sheet flow fan sequences. discontinuous granule, gravel and sandy lenses. Occur on a flat floodplain with some narrow levee banks flanking Fluvial sediments with mainly overbank characteristics. Some associated sheet flow deposits. Channel lenses and stringers, partly related to current drainage. Extensive clays with interbedded fine gravel and sandy lenses. Patchy dark brown to black, and lithic ferruginous lag overlying a generally flat plain. Soils are red earths and duplex soils Aeolian sediments Longitudinal dunes either as single units or small sets developed along the edge of saline lake environments and adjacent to calcareous dune systems at the edge of saline water bodies. The dunes are on broad valley plains along the drainage axes. Small playa lakes and lunettes are common. Aeolian sand derived from colluvial sands originating from granitic substrate; some lateritic gravels and duricrusts Colluvial sediments Sheet flow deposit Clay loam to light clays overlying greenstone saprock and saprolite. Channel deposits present in broad flat drainage floors within alluvial plain in broad major tributary valleys. Granule to gravel sized lag consisting of ferruginous Alluvial and lacustrine sediments with rarer sheet flow sediments with some aeolian reworking.

Sheet flow sediments; rare exposures of pallid granitic saprolite. Gritty sand to loam textured colluvium; some fine gravel bedload as lenses. Coarse granular quartzo-feldspathic lags. Pockets of granitic saprolite (grus). Some hardpan within 2m of surface. Some fresh rock substrate below colluvium; pockets of calcrete. Sheet flow sediments. Fine granules and sand on broad low rises; ferruginous fine granules on low crests; lithic fragments and coarse quartz overlies clays in depressions. Wanderrie patterned sheet flow fans over greenstone saprolite and saprock. Black pisolithic ferruginous granules to clayey sands occupy the continuous elongated rises. Clays occupy the elongated hollows. Shallow hardpan is extensive. Complex rises and hollows on a slightly inclined plain. Clay loam textured sheet flow deposit up to 1.5m thick on weathered and fresh bedrock; some coarse sandy and granule bedload lenses; hardpan at about 0.75m. Ferruginous saprolitic lag: lithic fragments, and quartzo-feldspathic Clay loams to light clays between 1 and 2m thick over granitic saprolite and saprock. Gravel and granule-sized lag consisting of saprolite, lithic fragments (mainly greenstone and some granite), pisolites and quartz. Hardpan 10cm below surface and 5 to 10m thick. Clay loams; lenses of coarse gravel dominated channel sediments. Hardpan less than 5m thick within 1m of the surface; substrate consists of stripped and weathered granitic bedrock. Some quartzo-feldspathic lag. Fine grained sediments; some lenses of coarse grained channel deposits. Extensive 2-5m thick hardpan; substrate consists of an extensive and deeply weathered stripped granitic profile. Minor contributions from mafic rock sources shown in lags. Hardpan from 0.5 to 1m; acid red earths common. Flat to gently inclined plains sometimes fan shaped. Granules (pisolitic) and sand as sheet flow fan deposits forming rises across the contours with clayey hollows. Extensive hardpan at 1m. The fans are developed on a gently inclined plain with less continuous rises and more 'continuous hollows. A "wanderrie" pattern is common.' Gritty clayey sands and sandy loams as sheet flow fan systems on weathered and fresh granite surfaces; quartz and feldspathic granule lags. Extensive hardpan at 0.75 to 1m & from 5 to 10m thick within sheet flow deposits covering a gently inclined flat plain now extensively incised. Gritty sandy loam to sandy clay loam as sheet flow fan deposits 1 to 3m thick overlying granitic saprolite and saprock, and forming a gently inclined flat plain. Quartzo-feldspathic and quartz gravel and pebble lag extensive. Some red Gritty sandy loams to sandy clay loams as 1 to 3m thick sheet flow deposits with hardpan over granitic saprolite and saprock. Extensive quartz, and quartzo-feldspathic gravel and pebble lag cover a very gently inclined flat plain. greenstone) saprock and saprolite. Gravel and granule sized lag consisting of ferruginous saprolite lithic fragments and quartz. Hardpan at 0.75cm below surface to 5m; Calcrete lag. Sheet flow deposits 1m to 2m thick consisting of clay loams to clays developed from greenstone bedrock but overlying granitic saprolite and saprock. Hardpan at 50cm to 1m and 5 to 10m thick. Lags of ferruginous saprolite, lithic fragments and minor quartz mantle a flat gently inclined plain. Some lenses of coarse channel deposits. Extensive 2-5m thick hardpan within 1m of surface. Weathered profiles on

shaped plain. Greenstone saprolite is predicted to be generally 15m below the surface. Some patches of hardpan present; granule to gravel lags dominated by ferruginous components. Extensive cobble and gravel-sized lag deposits derived from greenstone outcrops and banded iron formation. Mid to lower slopes of strike ridges and inter-ridge hilly tracts are mantled by saprolite fragments. Extensive sheet flow deposits over granitic saprolite at 2 - 6m. Some granitic saprolite as outcrop. Extensive quartzofeldspathic granule lag. Significant patches of quartz gravel and pebble lag over a gently inclined flat plain. Sheet flow deposits with local coarser channel deposits as lenses and stringers. Clay loams and light clays dominate the sheet flow sediment. Ferruginous and lithic gravel and granule lag with some quartz fragments. Materials derived from nearby felsic volcanics. Fans overlie a flat gently inclined plain. Clay loam and light clay dominated sheet flow deposits over felsic volcanics as saprock and saprolite at 1 to 2m. Hardpan locally up to 1m deep. Lag consists of ferruginous saprolite and lithic fragments with dark brown and black Clay loam sheet flow deposits over weathered greenstone at 1 to 3m. Gravel and granule lag consisting of ferruginous saprolite, lithic fragments and quartz. Some hardpan and calcrete. Local pockets of exposed fresh greenstone and saprolite. Red earths with carbonate, and calcareous earths. Colluvial clayey sands; some hardpan within the upper 2m of the regolith, and rarer pockets of calcrete.

Sediments initially of fluvial origin and containing groundwater calcrete. Mixed sheet flow deposit and channel stringers. Some aeolian reworking of the sandier portions of the sheet flows. Formed on a plain along the main drainage axes. Acid sandy red earths and acid red sands; shallow calcareous earths. Deep colluvial clayey sands and aeolian sands; some saprock exposed; some lateritic gravels and duricrust exposed, and as subcrop on broad crests. Extensive lateritic profiles eroded on crests. Deep colluvial sands and gravels on slopes and swales. Saprolite is Wind-modified sheet flow sediments underlain by highly weathered granitic bedrock; small patches of calcrete

CHpd3

Clay loams forming sheet flow deposits on very slightly undulating greenstone tracts with black shales; few very low hills. Lag is ferruginous granule and gravel, lithic fragments and quartz. Some carbonate patches in subsoils; some hardpan development and patches of calcareous, and red earths. Sheet flow deposits 1 to 2m thick over granitic and minor greenstone saprolite consisting of light clay to clay loam formed on a gently undulating erosional plain with few rises and very low hills. Carbonate at 50cm. Lag of lithic fragments, and quartzo-feldspathic gravel and granules. Hardpan at 1m. Sediments up to about 2m thick over fresh granite to granite saprolite; surface lag consisting of quartzo-feldspathic Clay loams to light clays over saprock to lesser weathered granite. Some calcrete skins on saprock; hardpan between

2 to 6m below surface, generally over granite. Regolith occurs on pediments flanking greenstone hills. Mainly granular, lithic and fe-stained granite with some greenstone lags. Sediments consisting of gritty sandy colluvium derived from weathered granitic bedrock. Outcrops of pallid saprolite and less weathered granite constitute about 10pc of surface expression. Regolith thickness is variable but less than 15m overall. Complex association of outcrop of saprock and saprolite of grantic bedrock and sheet flow fan systems to 1.5m. Some calcrete and hardpan. Dark brown and black ferruginous and lithic fragments as lag over a gently inclined very slightly undulating plain. Acid red earths on sheet flow fans. In eroded areas elsewhere calcareous earths dominate. Colluvial sediments consisting of gritty sandy loam derived from a substrate varying from weathered to fresh granitic bedrock. Small patches of fresh granitic bedrock are exposed but only represent about 5pc of the surface exposure. Regolith thickness varies from 4m to less than 1m. Complex patches of sheet flow sediment and areas of exposed greenstone saprock and fresh greenstone appearing on broad very low flat-topped rises on a slightly inclined plain. Small exposures of lateritic residuum beneath sediment. Small patches of calcrete. Large patches of hardpan. Pockets of gritty sandy colluvium derived from weathering granite.

Sediments consisting of 1-2m thick sandy to clayey loams with extensive surface gravel and granular quartzo-feldspathic and ferruginous lag; underlain by metasediments (shales) and granite. 5m thick hardpan within >0.5m depth; pockets of calcrete, and gravel lenses. Colluvium consisting of gritty red sand overlying granitic bedrock. Distinctive quartz gravel cobble and boulder lag. Associated with flanking slopes from strike ridges formed from quartz dykes. Notable because of the lack of vegetation; eucalypts, grasses and rarer mulga on the lower footslopes. Sheet flow deposits consisting of light clays and gritty clays. Lags consist of lithic fragments from gravel to granule size. Sheet flow systems form narrow colluvial apron below low hills associated with doleritic bedrock. Hardpan is rare; red earth soils are sometimes shallow and stony. Colluvium consisting of gritty red sand overlying granitic bedrock. Some cobble to gravel scree on gentler fringing slopes of granitic hills occurring as dome forms with exposed tors. Generally free of vegetation but grasses and thinned mulga surround the colluvial fringes. Gritty sands and sandy loams as shallow sheet flow fans on fresh and weathered granitic bedrock. Lags of mainly quartzo-feldspathic granules and gravels with small pockets of ferruginised lithic fragments. Rare zones of greenstone bedrock forming low ridges amongst low granitic hills and domes.

Calcrete up to 10m thick, overlain by and interleaved with fluvial deposits but also rests directly on granite saprolite saprock and unweathered granite. Usually occupies broad drainage axes within major valley floors. Slight irregular

Gritty sand and sandy loams 1 to 2m thick overlying pale brown to whitish granitic saprolite. Quartzo-feldspathic granular lag is extensive. Saline conditions are often present and small outcrops of granitic bedrock are visible. CFfc3 Distinct upper breakaways occur above this pediment form. **E**vaporite Lacustrine sediments Clays, halite and gypsum; aeolian sands with gypsum; rare unmodified sheet flow sediments; rare patches of

depressions, undulations and minor sinkholes are common. Lacustrine sediments Lacustrine sediments Extensive playa floors consisting of sediments dominated by clays, gypsum and halite;

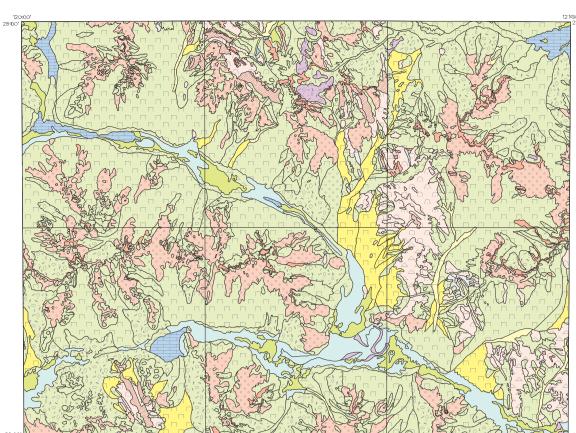
Saline clays, aeolian sands with halite, gypsum and some calcrete developed over fluvial sediments at about 10m depth. A complex pattern of small playas, clays pans, lunettes and hummocks covered with halophitic shrubs and In-situ regolith

Saprolite	Completely weathered bedrock
SCe1	Large patches of shallow gritty sand; locally derived colluvium; extensive quartzo-feldspathic grits; boulder and cobble silcrete lag common; extensive pallid saprolite exposures.
SCer1	Fine granular ferruginous veneer on weathered greenstones. Represents erosional relicts of an earlier extensive weathered landsurface. Crestal regions are slightly eroded exposing deeper parts of the weathered mantle. Lateritic materials (pisolitic and indurated), iron segregations, hardpan, fe-saprolite.
SCer2	Nodular, pisolitic to black massive iron-rich duricrusts up to 1.5m thick formed over ferruginous greenstone saprolite. Occur on inclined crests of mesaform rises and low hills surrounded by erosional tracts and nearby breakaways. Red earthy sands to loams with granule to gravelly lags.
	Very highly weathered bedrock
SVep1	Rare outcrops of fresh granitic bedrock; common pallid granite saprolite exposures and subcrop; thin discontinuous colluvial gritty sands with quartzo-feldspathic granule lag with rare silcrete fragments and very rarely developed calcrete.
SVei1	Highly kaolinized granitic bedrock; rare fresh outcrop; local pockets of colluvial gritty sand; lag consists of quartzo- feldspathic grits and gravel, and some silcrete cobble.
SVer1	Extensive exposures of greenstone sequences with local patches of ferruginous saprolite usually as flat ridge crests. Calcrete, extensive stony colluvium. Localised exposures of iron segregations (massive ironstone). Lags consisting of ferruginous and lithic fragments.
SVel1	Outcrops of greenstone bedrock and fresh unweathered rock with pockets of red clay. Saprolite contains iron segregations. Extensive lag deposits consisting of iron segregations and fresh and iron indurated greenstone saprock ranging from pebble to boulder sizes. Rare pockets of laterite.
SVee1	Ferruginous greenstone saprolite with pockets of Fe-rich duricrust and pisolitic laterite merging at depth with mottled saprolite and saprock. Fresh rock from 10 to 30m. Well developed breakaways in greenstone with capping of ferruginous materials; short ravines; some minor crests.
	Moderately weathered bedrock
SMec1	Extensive granitic saprock and saprolite overlain by patches of shallow sheet flow fan. Frequent lag consisting of fresh and weathered lithic fragments. Some ferruginous dark brown gravels and granules on a very slightly undulating often very gently inclined plain with local alluvial tracts.
SMel3	Moderately weathered greenstone bedrock with patches of calcrete. Some colluvium and scree deposits on hills to low hills and moderately eroding slopes. A general mantle of cobble-sized lag is present. Little or no deeply weathered remnants remain in these hilly belts.
SMeI1	Saprolite with patches of calcrete, some colluvial slopes. An extensive mantle of cobble-sized lag is present on rises to low hills and active gentle erosional slopes but not in narrow alluvial tracts and active channels in valley floors.
SMel2	Moderately weathered gabbro forming saprolite pockets over low hills to hills. Coarse gravel and cobble gabbro lag with occasional calcrete cappings, and patches of calcareous red clay. Narrow alluvial tracts within floors of shallow valleys.
SMel4	Patches of lateritic residuum. Some duricrust, iron segregations, mottled zone and calcrete. Clayey sands and clay loams, ferruginous granules, and gravels often formed as colluvium. Extensive saprock and saprolite at depth. Rare outcrops of fresh rock. Lags variable and extensive.
SMeh1	Pockets of moderately weathered greenstone bedrock forming saprolite, and banded iron formation forming hills and prominent strike ridges with elongate outcrops. Patches of calcrete. Very minor alluvial tracts with active channels. Extensive cobble sized country rock lag.
	Slightly weathered bedrock
SSec1	Saprock extensively developed over greenstone subcrop. Patchy calcrete exposures. Extensive granule sized lag; some narrow alluvial tracts with minor drainage channels in broad drainage floors within a complex array of very low rises and shallow swales. Generally, part of a gently undulating plain.
SSec2	Saprock extensively developed over greenstone subcrop. Discontinuous colluvial mantles; some local alluvium. Greenstone saprolite common. Some grantic bedrock. Dark brown to black gravel and granule lag common but some patches of quartzo-feldspathic granule lag on a gently undulating plain.

RADIOMETRIC SIGNATURE

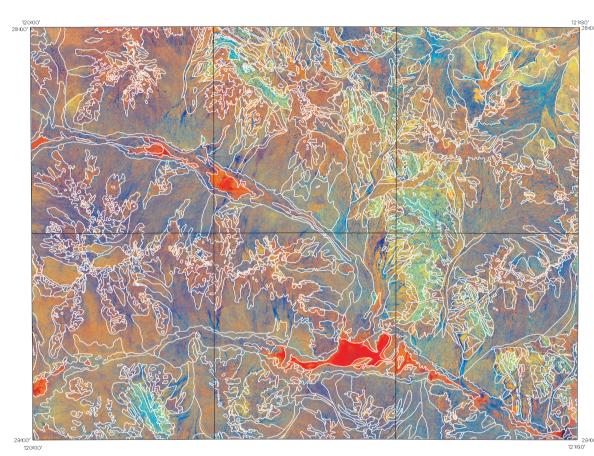
patches of quartzo-feldspathic granule lag on a gently undulating plain.

Potassium (Regions associated with exposed granitic bedrock) Thorium (Various ferruginous materials at the surface) Uranium (Calcrete, calcareous sediments and soils) Low K, Th, U (Duricrusts and exposed bedrock low in K, Th & U; often greenstones and some sandplains) White to yellowish High K, Th, U (Geomorphically active regions associated with exposed granitic saprolite and sediments derived from granite)



LEONORA REGOLITH-LANDFORMS

ENHANCED THEMATIC MAPPER IMAGE OF LEONORA WITH REGOLITH POLYGONS



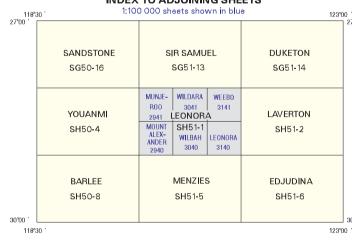
Clay dominated surface response Iron oxide dominated surface response Vegetation dominated surface response Surfaces with iron oxides and clays dominated Vegetated regions on iron oxide dominated surfaces Vegetated regions on dominantly clay covered surfaces

INTERPRETED LANDSCAPE CLASSES



NOTE: The CSIRO "RED" classification is those more familiar with that scheme

INDEX TO ADJOINING SHEETS





NGMA PRODUCT OF THE NATIONAL GEOSCIENCE MAPPING ACCORD A COLLABORATIVE PROJECT

BETWEEN AGSO AND GSWA

DIGITAL DATA All map elements are stored digitally as topologically structured Arc/Info coverages. Descriptions for each of the map polygons and site data are stored in an Oracle relational database. Map information can be purchased from AGSO as

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hard copy plots and as digital data sets.

LEONORA



REGOLITH-LANDFORMS IMAGE MAP SHEET SH51-1

EDITION 1 January 1998 WARNING: Colours will fade with prolonged exposure to light

