

RENNER SPRINGS & HELEN SPRINGS  
1:20,000 SCALE MAPPING UNITS

TSB, V1.8, 4 March 2010

Notes

All mapping units are descriptive and were defined using descriptive criteria only. Lithological descriptions are based on field observations only and are a summary of the dominant exposed rock type.







Mapping units are not in stratigraphic order between marked boundaries.

Mapping unit codes are explained in the accompanying report.





Where bedrock geology can be interpreted through relatively thin Quaternary cover (alluvium, colluvium, talus, calcrete) it has been mapped as bedrock.

Equivalent Northern Territory Geological Survey (NTGS) Proterozoic lithostratigraphic units are approximate.





Background Colours

	Mn mineralisation
	Clay rich, commonly strongly weathered
	Fe bearing and Fe altered
	Si and Fe altered
	Si altered, post diagenesis
	Relatively unaltered

Lineaments

	F	Fault, fracture, aerial photograph lineament
	QV	Quartz vein
<b>Aerial Photograph Bedding Dips</b>		
	0-15°	
	15°-45°	

Minor Fold Axes

	Anticline axial trace and plunge direction
	Anticline axial trace
	Syncline axial trace and plunge direction
	Syncline axial trace

Quaternary

**QuA** Alluvium, colluvium, talus, calcrete (undivided). Associated with active sedimentary systems.

Tertiary?

**TC** Cobble conglomerate. Strongly ferruginous clasts up to 20 cm across in a granular to very coarse-grained ferruginous matrix. Associated with Cretaceous deposits.

Cretaceous?

**CeM** Sandstone overlain by ferruginous shale. Shale has been lateritised.

**CeS** Coarse- to medium-grained sandstone, lesser siltstone, local basal conglomerate (CeC). Commonly ferruginous and lateritised. Locally capped by reworked ferruginous gravel (Tertiary?).

**CeC** Conglomerate, at base of Cretaceous succession. Mostly a lag of sandstone cobbles and boulders. Rare in situ exposures of sandy conglomerate. Clasts commonly > 50 cm across.

**CeSi** Silcreted bedrock, silcrete breccia. Locally at base of Cretaceous succession.

Cambrian

Present around the areas mapped. Basalt, sandstone, peperite.

RENNER SPRINGS AREA

Renner Group

**RRS** Coarse- to medium-/fine-grained sandstone. Flat thinly bedded to flat laminated. Mudflake breccias, minor cross bedding. Renner Group sandstone (Stratigraphic position uncertain; NTGS Grayling Member).

**RRdS** Coarse- to medium-grained sandstone. Locally very coarse- and fine-grained. Commonly cross bedded, sets 5-20 cm thick. Local granule quartz conglomerate bed(s). Contact with underlying units not seen therefore stratigraphic relationships uncertain. (NTGS Powell Fm).

**RReS** Medium- to fine-grained sandstone. Basal coarser sandstone to pebble conglomerate. Mostly thinly parallel bedded. (Not mapped by NTGS; Baralandji Fm?).

**RRbS** Very coarse-grained granular sandstone, commonly pebbly. Very coarse- to coarse grained non pebbly sandstone. Mostly cross bedded (sets typically 10-40 cm, up to >100 cm). Local sandy pebble to cobble conglomerate. (NTGS Gleeson Fm).

**RRaS** Coarse- to medium-grained sandstone, locally finer grained. Mostly thinly parallel bedded, locally thinly cross bedded. Symmetrical ripple marks, rare desiccation cracks. (Includes NTGS Gleeson Fm and Willieray Fm).

HELEN SPRINGS AREA

Renner Group

**HRM** Dolomitic? fine-grained sandstone to siltstone. Parallel laminated. (Stratigraphic position uncertain; not mapped by NTGS).

**HRS** Sandstone. (Stratigraphic position uncertain; NTGS Gleeson Formation).

**HR2eSFe** Ferruginous HR2eS (NTGS Powell Fm).

**HR2eS** Coarse- to medium-grained sandstone, locally coarser. Commonly cross bedded, sets 5-20 cm thick. Local mudflake breccias and symmetrical ripple marks. (NTGS Powell Fm).

**HR2dSFe** Ferruginous granule conglomerate to fine pebble conglomerate. Rounded quartz grains 2-5 mm with local larger clasts typically 5-10 cm, up to 20 cm. Plus laminated to thinly bedded medium- to very fine-grained sandstone to mudstone. (Approximate base of NTGS Powell Fm).

**HR2eSXFe** Brecciated, ferruginous HR2eS. (NTGS Grayling Member).

**HR2eS** Very coarse- to medium-grained sandstone. Thinly parallel bedded and thinly cross bedded. (NTGS Grayling Member).

**HR2bM** Laminated micaceous fine-grained sandstone to siltstone (NTGS Grayling Member).

**HR2bS** Very coarse-grained sandstone. Cross bedded, sets up to 80 cm (NTGS Gleeson Formation).

**HR2aS** Sandstone, pebbly sandstone, local pebble conglomerate units up to 1.5 m thick. Sandstone varies from medium- to fine-grained to granular very coarse-grained. Coarser grained sandstone is cross bedded (sets up to 20 cm) and locally pebbly. Finer grained sandstone is parallel bedded with mudflake breccias and symmetrical ripple marks. (NTGS Gleeson Fm).

**HR1-2aS** Mostly granular very coarse-grained sandstone. Minor pebbles. Commonly medium cross bedded. (NTGS Gleeson Fm).

**HR1bSFe** Ferruginous HR1bS (NTGS Gleeson Fm).

**HR1bS** Mostly granular very coarse-grained sandstone. Commonly pebbly to cobbly. Commonly medium cross bedded. Possible cross bed set up to 2 m near base. Local pebbly to cobbly conglomerate horizons up to 1 m thick. (NTGS Gleeson Fm).

**HR1aS** Granular very coarse-grained sandstone. Parallel bedded (NTGS Gleeson Fm).

Namerinni Group Package 4

**RN4MSFeMn** Ferruginous very fine-grained sandstone to siltstone. Brecciated in places and locally manganese stained. Cut by massive manganese "pods" (1-10 m across) containing fragments of sandstone and siltstone. (NTGS Cretaceous).

**RN4MSCy** Fine- to very fine-grained sandstone, siltstone and mudstone. Commonly clay rich. Some cherty. Most strongly weathered. Mostly parallel laminated to thinly bedded, lesser medium bedded. Some wavy laminated/bbedded. Some lamination/bedding is lenticular. Rare pebble conglomerate with pebbles up to 4 cm (mostly 2 cm). (NTGS Shillinglaw Fm).

**RN4MSDCt** Cherty mudstone, cherty siltstone and fine-grained sandstone. Fine-grained sandstone to siltstone. Dolomitic sandstone. Massive dolomite. Most are parallel laminated to parallel thinly bedded. Rare stromatolites. Rare possible gypsum pseudomorphs (NTGS Shillinglaw Fm).

**RN4DS** Mostly sandy dolomite. Percentage of mostly medium- to fine-grained quartz sand component variable. Lesser dolomitic sandstone and massive crystalline dolomite. Rare stromatolites. Bedding weathers as 10-100 cm steps that are either structureless or have wavy discontinuous lamination. Commonly calcreted. (NTGS Shillinglaw Fm).

Namerinni Group Package 3

**RN3MXMn** Massive manganese containing fragments of cherty mudstone and fine- to very fine-grained sandstone. Most clasts have no preferred orientation (NTGS Shillinglaw Fm).

**RN3MXBMn** Bedding parallel manganese-mineralised horizon. Manganese contains fragments of sandstone, siltstone, mudstone, cherty mudstone and rare silicified stromatolites. Degree of manganese mineralisation and bedrock brecciation varies. Bedding retained by preferred orientation of clasts. (NTGS Shillinglaw Fm).

**RN3MCy** Strongly weathered laminated to thinly bedded fine grained sedimentary rocks. Essentially quartz and clay. Also includes relatively unaltered mudstone. (NTGS Cretaceous and Carruthers and Shillinglaw Fms).

**RN3CtFe** Ferruginous cherty mudstone. Parallel very thinly to thinly bedded. Some wavy lamination. Locally there are cavities on weathered surfaces (after dolomite?). (NTGS Shillinglaw Fm).

**RN3MXSFe** Ferruginous, variably silicified mudstone and minor siltstone. Locally retains bedding which is either parallel or undulating, broken, and tapers and thickens long strike. Locally brecciated. (NTGS Shillinglaw Fm).

**RN3SSI** Silicified sandstone and chert pebble conglomerate. (NTGS Shillinglaw Fm).

**RN3S** Mostly medium-grained sandstone. Mudflake breccias and molds of tabular lithic clasts common. Symmetrical ripple marks and medium cross bedded units recorded. (NTGS Shillinglaw Fm).

**RN3DC** Conglomerate. Clasts mm-sized to 20 cm, largest 50 cm, dominated by dolomite and sandy dolomite with lesser medium- to very fine-grained sandstone and siltstone. Beds 2 m to possibly 5 m thick. Becomes interbedded with coarse-grained sandstone upwards; base not exposed. (NTGS Shillinglaw Fm).

**RN3MCt** Cherty mudstone. Laminated to thinly bedded (NTGS Shillinglaw Fm).

**RN3M** Mudstone, siltstone, fine- to very fine-grained sandstone, lesser coarser grained sandstone. Fine grained rocks are commonly cherty. Mostly parallel laminated to thinly bedded. Mudstone locally structureless forming 20-100 cm "steps". Symmetrical ripple marks, silicified stromatolites, intraformational breccias and folds. (NTGS Shillinglaw Fm).

**RN3MD** Very fine-grained sandstone, siltstone, mudstone. Probably dolomitic. Parallel laminated to thinly bedded. Halite pseudomorphs. Silicified stromatolites. (NTGS Carruthers and Shillinglaw Fms).

Namerinni Group Package 2

**RN2Mn** Manganese containing fragments of laminated chert. (NTGS Carruthers Fm).

**RN2MFe** Ferruginous fine- to very fine-grained sandstone and mudstone. (NTGS Carruthers Fm).

**RN2SXS** Medium- to fine-grained sandstone. Variably silicified, brecciated and quartz-veined. (NTGS Carruthers Fm).

**RN2MXS** Strongly silicified, locally brecciated fine grained sedimentary rock (sandstone, mudstone, dolomite?). Locally lamination to thin bedding and stromatolites preserved. Commonly cut by quartz veins that cross bedding and are parallel to bedding. Local calcite. Minor vein breccias, quartz cockade textures and secondary chalcadonic laminae. (NTGS Carruthers Fm).

**RN2S** Mostly medium- to fine-grained sandstone. Less abundant coarser and finer sandstone. Mostly parallel very thinly to thinly bedded. Common symmetrical ripple marks and mudflake breccias. Less common asymmetrical ripple marks. Rare pebble conglomerate and desiccation cracks. (NTGS Carruthers Fm).

**RN2M** Siltstone, mudstone (some cherty), lesser fine- to very fine-grained sandstone. Parallel laminated to thinly bedded. Rare ripple cross lamination and halite pseudomorphs. (NTGS Carruthers Fm).

**RN2MD** Fine-grained sandstone, mudstone and dolomitic? mudstone Parallel very thinly to thinly bedded. (NTGS Cretaceous).

**RN2D** Dolomite. Wavy laminated to very thinly bedded. Minor mudstone laminae. Minor silicification. (NTGS Carruthers Fm).

Namerinni Group Package 1

**RN1SSI** Variable silicified RN1S. (NTGS Carmilly Fm, Jeromah Fm).

**RN1S** Coarse- to medium-grained sandstone. Parallel very thinly to thinly bedded and medium cross bedded. Symmetrical and asymmetrical ripple marks common in lowest unit. Local mudflake breccias. (NTGS Carmilly Fm, Jeromah Fm).

Namerinni Group Package 3

**HN3S** Coarse-grained ferruginous sandstone Wavy, parallel thinly bedded. (NTGS Willieray Fm).

**HN3M** Siltstone. Parallel very thinly to thinly bedded. Locally ferruginous. (NTGS Jeromah Fm, Willieray Fm).

Namerinni Group Package 2

**HN2SXFe** Variably brecciated HN2S with a ferruginous sandy matrix. (NTGS Bootu Fm, Jeromah Fm).

**HN2SFe** Ferruginous HN2S (NTGS Carmilly Fm, Jeromah Fm).

**HN2MXFe** Ferruginous (variable) mudstone and chert. Wavy lamination to thinly bedded. "Nodular" and poddy textures, bedding parallel brecciation. (NTGS Bootu Fm, Carmilly Fm, Jeromah Fm).

**HN2S** Coarse- to medium-grained sandstone. Local, but probably stratigraphically continuous, pebble to boulder conglomerate horizon(s) and pebbly granular to very coarse-grained sandstone. Medium cross bedded, common mudflake breccias, rare ripple marks. Locally brecciated, brecciated and ferruginous, and ferruginous. (NTGS Bootu Fm, Carmilly Fm, Jeromah Fm).

**HN2Ct** Laminated chert (silicified mudstone?). (NTGS Carmilly Fm).

Namerinni Group Package 1

**HN1S** Coarse- to medium-grained sandstone. Local mudflake breccias. (NTGS Bootu Fm).

Proterozoic

Tomkinson Creek Group

**HTSFeMn** Ferruginous sandstone. Cut by rare massive manganese "pods" (up to 4 m across). (NTGS Attack Creek Fm).

**HTSFe** Ferruginous coarse- to medium-grained sandstone. Parallel thinly bedded, cross bedded, symmetrical ripple marks. (NTGS Attack Creek Fm, Bootu Fm).

**HTS** Very coarse- and coarse- to medium-grained sandstone. Mostly cross bedded (medium to thickly). Local mudflake breccias and minor pebbles. (NTGS Bootu Fm).