

MRA Mount Rat Land System

A system dominated by rising ground consisting of rise surfaces and slopes, and including the low hill of Mount Rat

Area: 59.0 km²

Landscape: A system dominated by rising ground consisting of rise surfaces and slopes, and including the low hill of Mount Rat. The area is in two parts separated by Urania Gap: a very small northern part, and the main southern part. This highland area is mostly underlain by Proterozoic age sandstones and Cambrian age limestones (Crawford, A.R., 1965). There is very little near surface expression of these rocks due to an overlying cover of younger material, however, pinkish sandstone was seen directly underlying calcrete on an upper slope on the western side of the system. It is likely that some of the calcrete on the relatively steep slopes on the west side of the system is underlain by sandstone. Calcareous loess blankets this system. Calcrete layers have formed in these carbonate-rich materials in many places. Clayey sediments underlie soils in places. It is likely that an intervening layer of clay (Hindmarsh Clay equivalent) lies between the bedrock and the carbonate-rich surface sediments.

Annual rainfall: 390 – 450 mm average

Main soils: **A4-A5** *calcareous loam*
B3 *shallow loam on calcrete*

Minor soils: **A6** *gradational calcareous clay loam*

Main features: Land in this system is mostly arable, however, a few areas of non-arable stony land occur. Many soils are underlain by calcrete at shallow depth and/or contain hard carbonate rubble – these limit profile waterholding capacity and hence productive potential. Surface stones also interfere with many farming practices.

Surface textures are invariably loams, and the most common soils are calcareous loams, many with calcrete at shallow depth.

Saline seepage affects some areas. Wet marginally saline patches occur on a few slopes where saline groundwater nears the land surface. Marginal salinity also affects some rise surface areas. However, it is not entirely clear whether this is associated with saline groundwater, or is the result of unusual soil and/or substrate conditions allowing a build-up of cyclic salt. The only indication of salinity in most soils is the presence of raised subsoil salinity levels.

All soils described during field work in this system were calcareous throughout. Calcareous soils restrict the availability of certain nutrients: deficiencies of the major nutrient phosphorus and the trace element zinc are common, while deficiencies of the trace elements manganese and iron are possible. Temporary trace element deficiencies can occur in cold and wet conditions with susceptible crops. This is particularly true for soils with highly calcareous surfaces.

On sloping land there is the potential for water erosion, especially on long slopes where water converges. Localised effects of water erosion were observed, in the form of rilling on some slopes.



Soil Landscape Unit summary: Mount Rat Land System (MRA)

SLU	% of area	Main features
ICE	0.3	Land dominated by calcareous soils formed in clayey sediments. Main soils: <i>gradational calcareous clay loam A6</i> grading to <i>calcareous loam A5</i> . ICE – low lying plain/drainage area (slopes 0-1%).
QHB QHD QHZ QHZx	4.7 0.7 0.3 -	Land dominated by shallow calcareous soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete B2</i> . QHB – rise (1-3%): with up to 20% non-arable stony areas. QHD – stony upper slopes (slopes 8-20%). QHZ – rise surface (slopes 0-1%). QHZx – rise surface (slopes 0-1.5%): the peak of Mount Rat.
QKB QKBg QKC QKCb QKL QKP QKQ QKZ	3.8 1.6 0.8 1.4 1.5 0.7 0.8 5.0	Land dominated by shallow calcareous soil on calcrete. Main soils: <i>shallow calcareous loam on calcrete B2</i> , with some <i>calcareous loam A4-A5</i> . QKB – rises and slopes (slopes 1-4%). QKBg – upper slopes with some drainage ways (slopes 1-7%). QKC – slopes (slopes 1-7%). QKCb – slopes (slopes 2-7%). QKL – slopes (1-5%). QKP – rise surface, showing surface expression of saline seepage (or dry saline land) (slopes <1%) QKQ – slopes, showing surface expression of saline seepage in vague drainage lows (slopes 1-3%) QKZ – rise surface, showing minor surface expression of saline seepage (or dry saline land) (slopes 0-1%).
SaB	2.9	Land dominated by soils formed in rubbly calcareous loess. Main soils: <i>rubbly calcareous loam A4-A5</i> . SaB – slopes and rises (slopes 0.5-1.5%).
ShB ShG ShLg ShZ	20.6 11.9 0.8 1.1	Land dominated by soils formed in rubbly calcareous loess. Main soils: <i>rubbly calcareous loam A4</i> , with some <i>shallow calcareous loam on calcrete B2</i> . ShB – slopes and rises with some drainage lows (slopes 1-3%). ShG – slopes and rises with a few drainage ways and with signs of rilling. There is a patch showing surface expression of saline seepage at the base of a slope in the very northwest of the unit (slopes 0.5-3%). ShLg – concave drainage area with some drainage lows (slopes 0.5-1.5%). ShZ – rise surface (slopes 0-1%).
SMBg SME	3.3 1.4	Land dominated by soils formed in calcareous loess. Main soils: <i>calcareous loam A4-A5</i> . SMBg – rises and slopes with a few drainage lines (slopes 0.5-3%). SME – depression on rise surface (slopes <1%).
SVL SVLs SVMg SVP SVPs SVQ SVZ SVZs	23.8 0.5 2.3 0.8 1.0 0.6 0.8 6.9	Land dominated by soils formed in calcareous loess. Main soils: <i>calcareous loam A4-A5</i> , with some <i>shallow calcareous loam on calcrete B2</i> . SVL – slopes and rises with a few drainage lows/depressions (slopes 0-2%). SVLs – slightly concave drainage area, showing minor surface expression of saline seepage in vague drainage lows (slopes 0.5-1.5%). SVMg – slopes with some drainage lows/drainage ways (slopes 1-3.5%). SVP – rise surface, showing minor surface expression of saline seepage (or dry saline land) (slopes 0-1%). SVPs – slightly low lying area on rise surface, showing surface expression of saline seepage (or dry saline land) (slopes 0-1%). SVQ – slopes on rise surface, showing surface expression of saline seepage (or dry saline land) (slopes 1-4%) SVZ – rise surface (slopes 0-1%). SVZs – rise surface (slopes 0-1%).



Detailed soil profile descriptions:**Main soils:****A5-A5** *calcareous loam* [Regolithic Lithocalcic-Hypercalcic Calcarosol]

Grey brown medium thickness calcareous loam grading to clay loamy subsoil with abundant fine carbonate. Profiles very often contain abundant hard carbonate rubble, and are occasionally underlain by clayey sediments (soil **A5**). Subsoils are usually strongly alkaline and dispersive.

B2 *shallow calcareous loam on calcrete* [Petrocalcic Calcarosol]

Grey brown calcareous loam, with calcrete at shallow depth. Subsoils are sometimes as heavily textured as clay loam. Profiles often contain abundant hard carbonate rubble.

Minor soils:**A6** *gradational calcareous clay loam* [Pedal Hypercalcic-Lithocalcic Calcarosol]

Calcareous grey brown medium thickness to thick loam to clay loam grading to clayey subsoil with abundant fine carbonate. Fine carbonate content increases with depth. Subsoils are dispersive. Profiles can include hard carbonate rubble. Typically found in depressions.

References: Crawford, A.R. (1965). 'The Geology of Yorke Peninsula'. *Bull. geol. Surv. S. Aust.*, 39.

Further information: [DEWNR Soil and Land Program](#)

