

# AGR Agery Rises Land System

Rises, summit surfaces and slopes, with sand over clay dunefields. The system is in two parts, separated by the Agery basin. The western part mostly consists of rising land, while the eastern part consists of rising land and slopes running down to the Agery basin. The rises of this system could be considered to form a northeastern part of the Yorke Peninsula central highlands zone.

**Area:** 90.3 km<sup>2</sup>

**Landscape:** Rises, summit surfaces and slopes, with sand over clay dunefields. The rising land in this system is probably the result of a bedrock high, however, there is little or no evidence of rock influencing soils. Sand dunes are the most obvious feature of this system. It is probable that in Pleistocene times sandy sediments were deposited by wind onto this land and formed into a dune/swale topography. Fine carbonate was probably associated with these sands but was subsequently leached. Dust storms during arid periods deposited dust over this land, which was subsequently translocated through the sandy topsoil, to accrue in the subsoil. Many such events resulted in 'sand over clay' texture profiles. This explanation is supported by the fact that clayey subsoils follow surface topography; and a similar process can be observed in younger sands in the Murray Mallee where lamellae of translocated dust occur in many profiles. These 'sand over clay' dunefields are significantly older than the mallee sand dunefields on the Peninsula, but have similar origins. Dunes have the general northwest-southeast orientation typical of inland dunes on the Peninsula. Reworking of sands has also occurred, resulting in thicker topsoil sand on dunes, and loss of sand in many swales. Water action has also removed surface sands in drainage areas.

In more recent times, calcareous loess/dust has been deposited on the system. This has resulted in a few deep to moderate depth deposits of calcareous loam, numerous calcreted areas with shallow soils, hard carbonate rubble in many profiles, and the ubiquitous presence of fine carbonate in subsoils or lower subsoils and some surface soils.

**Annual rainfall:** 385 – 450 mm average

**Main soils:**

- G4** Loamy sand to sandy loam over clay (around 30% of area)
- D3** Sandy loam to clay loam over red clay (around 22% of area)
- B6-B7** Shallow sandy loam to loamy sand over clay on calcrete (around 17% of area)
- G3-G4** Sand over clay (around 14% of area)
- B2** Shallow calcareous sandy loam on calcrete (around 8% of area)
- B3** Shallow sandy loam on calcrete (around 6% of area)

**Main features:** The majority of the system is arable. The most common soils are sands over clay, and sandy loams to clay loams over clay. Sandy topsoils are inherently infertile, from which soluble nutrients are easily leached. Clayey subsoils limit the loss of nutrients from the profile, although nutrients can be lost as seepage along clay surfaces to lower lying areas. Sandy surfaces have a significant potential for wind erosion. Careful surface management is needed to prevent this. Waterlogging can be a problem, especially in low lying areas, due to clayey subsoils restricting internal drainage. Some soils are calcareous throughout, but rarely have highly calcareous surfaces. Calcareous soils can limit the availability of certain nutrients, the level of this effect on crops depends on the level of fine carbonate in the surface soil. 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.



Water erosion is a potential problem on some slopes. Soils with hard carbonate rubble and/or shallow depth to calcrete have reduced effective water holding capacities, and hence reduced production potentials. Also surface rubble interferes with some farming operations

### Soil Landscape Unit summary: Agery Rises Land System (AGR)

SLU	% of area	Main features
GIB GIBg GIC GIE GIZ	7.9 3.3 1.0 0.4 4.4	Land dominated by sand over clay soils. Main soils: <i>loamy sand to sandy loam over clay G4</i> grading to <i>sandy loam to clay loam over red clay D3</i> . With limited to common areas of <i>shallow sandy loam to loamy sand over clay on calcrete B7-B6</i> . And with extensive areas of <i>sand over clay G3-G4</i> on low sandy rises. <b>GIB</b> – slopes and rises with some drainage ways (slopes 0.5-3.5%). <b>GIBg</b> – slopes and rises with drainage lines (slopes 0.5-3.5%). <b>GIC</b> – slopes with some drainage ways (slopes 2-8%). <b>GIE</b> – drainage depression (slopes 0-1%). <b>GIZ</b> – summit surface (slopes 0-1%).
GJA GJB GJE GJL GJLz	1.3 0.2 1.1 0.7 7.4	Land dominated by sand over clay soils. Main soils: <i>loamy sand to sandy loam over clay G4</i> grading to <i>sandy loam over clay loam over red clay D3</i> . Limited to common areas of the heaviest textured <b>D3</b> soils occur in flats/lows/scalds. <b>GJA</b> – rises and slight slopes (slopes 0.5-2%). <b>GJB</b> – lower slope (slopes 0.5-2%). <b>GJE</b> – drainage depression (slopes 0-1%). <b>GJL</b> – lower slopes (1-2.5%). <b>GJLz</b> – rises with drainage ways and minor scalding (slopes).
GKA GKB GKK GKL GKZ	11.9 5.4 2.1 3.2 1.5	Land dominated by sand over clay soils. Main soils: <i>sandy loam to clay loam over red clay D3</i> grading to <i>loamy sand to sandy loam over clay G4</i> . With limited to common areas of <i>shallow sandy loam to loamy sand over clay on calcrete B6-B7</i> . And minor to limited <i>gradational calcareous clay loam to calcareous loam on clay A6-A5</i> . <b>GKA</b> – gently undulating plains with drainage lows and some low sandy rises (slopes 0-2%). <b>GKB</b> – slopes with drainage ways (slopes 0.5-4%). <b>GKK</b> – slight slopes, and including relatively low lying plains, with drainage ways (slopes 0.5-1.5%). <b>GKL</b> – slopes and rises (slopes 0.5-3.5%). <b>GKZ</b> – summit surface (slopes 0-1%).
OaC	4.4	Land dominated by thick sand over clay sand dunes. Main soils: <i>thick sand over clay G3</i> with some <i>sand over clay G4</i> . <b>OaC</b> – sand dunes.
ObD	4.5	Land dominated by thick sand over clay sand dunes. Main soils: <i>sand over clay G4-G3</i> grading to <i>sand over sandy clay loam G2-G1</i> . <b>ObD</b> – low sand dunes.
Ocb OcF OcM OcP	1.5 0.7 1.1 3.1	Land with >30% sand over clay sand dunes. Dune soils: <i>thick sand over clay G3</i> with some <i>sand over clay G4</i> . Swale soils: <i>sandy loam to clay loam over red clay D3</i> grading to <i>loamy sand to sandy loam over clay G4</i> . <b>Ocb</b> – dunefield with 60-90% dunes. <b>OcF</b> – dunefield with 60-90% dunes. <b>OcM</b> – dunefield with 60-90% dunes. <b>OcP</b> – dunefield with 30-60% dunes.
OdG Odj	0.1 0.2	Land with >30% sand over clay sand dunes. Dune soils: <i>sand over clay G3-G4</i> . Swale soils: <i>loamy sand to sandy loam over clay G4</i> grading to <i>sandy loam to clay loam over red clay D3</i> . <b>OdG</b> – dunefield with 60-90% low dunes or sandy rises. <b>Odj</b> – dunefield with 60-90% low dunes or sandy rises.
QjB	0.6	Land dominated by shallow soils on calcrete.



QjBg QjL QjZ	1.1 0.4 1.1	<p>Main soils: <i>shallow calcareous sandy loam on calcrete</i> <b>B2</b>, and extensive areas of <i>shallow sandy loam to loamy sand over clay on calcrete</i> <b>B6-B7</b>. With limited to common areas of <i>shallow sandy loam on calcrete</i> <b>B3</b>, and <i>calcareous loam</i> <b>A4-A5</b>.</p> <p><b>QjB</b> – slopes with drainage ways (slopes 1-3.5%).  <b>QjBg</b> – slopes with drainage lines (slopes 1-3.5%).  <b>QjL</b> – lower slope (slopes 0.5-2.5%).  <b>QjZ</b> – elevated gently undulating plains/summit surface (slopes 0-1%).</p>
QRA	0.9	<p>Land dominated by shallow calcareous soils on calcrete.                  Main soils: <i>shallow calcareous sandy loam on calcrete</i> <b>B2</b> including some <i>shallow sandy loam on calcrete</i> <b>B3</b>.</p> <p><b>QRA</b> – somewhat elevated gently undulating plain (slopes 0-1.5%).</p>
QTA QTB	8.9 1.4	<p>Land dominated by shallow calcareous soils on calcrete.                  Main soils: <i>shallow calcareous sandy loam on calcrete</i> <b>B2</b> including some <i>shallow sandy loam on calcrete</i> <b>B3</b> and <i>shallow sandy loam to loamy sand over clay on calcrete</i> <b>B6-B7</b>. With limited to common areas of <i>calcareous loam</i> <b>A5-A4</b>.</p> <p><b>QTA</b> – level to gently undulating stony plain, with vague drainage lows, and with a few remnant stony dune rises (slopes 0-1%).  <b>QTB</b> – stony slopes (slopes 1-3%).</p>
RAK	4.5	<p>Land dominated by shallow soils on calcrete.                  Main soils: <i>shallow sandy loam on calcrete</i> <b>B3</b>. With limited to common areas of <i>sandy loam to clay loam over red clay</i> <b>D3</b> grading to <i>loamy sand to sandy loam over clay</i> <b>G4</b>, <i>calcareous loam</i> <b>A4-A5</b>, <i>shallow calcareous sandy loam on calcrete</i> <b>B2</b>, and <i>shallow sandy loam over clay on calcrete</i> <b>B6</b>.</p> <p><b>RAK</b> – level to gently undulating stony plains with drainage lows (slopes 0-1%).</p>
RDB RDL	0.8 0.7	<p>Land dominated by shallow soils on calcrete.                  Main soils: <i>shallow sandy loam on calcrete</i> <b>B3</b>, including some <i>shallow calcareous sandy loam on calcrete</i> <b>B2</b>. And extensive areas of <i>loamy sand to sandy loam over clay</i> <b>G4</b> including some <i>sandy loam to clay loam over red clay</i> <b>D3</b>.</p> <p><b>RDB</b> – slopes (slopes 1-3.5%).  <b>RDL</b> – slopes (slopes 0.5-3%).</p>
RRE RRL	0.3 0.2	<p>Land dominated by shallow soils on calcrete.                  Main soils: <i>shallow sandy loam to loamy sand over clay on calcrete</i> <b>B6-B7</b>. With limited to common areas of <i>sandy loam to clay loam over red clay</i> <b>D3</b> and <i>loamy sand to sandy loam over clay</i> <b>G4</b>.</p> <p><b>RRE</b> – relatively low lying gently undulating plain (slopes 0-1.5%).  <b>RRL</b> – lower slopes with drainage lows (slopes 0.5-2%).</p>
RTB RTC RTL	9.4 0.4 1.8	<p>Land dominated by shallow soils on calcrete.                  Main soils: <i>shallow sandy loam to loamy sand over clay on calcrete</i> <b>B6-B7</b>. With limited to common areas of <i>sandy loam to clay loam over red clay</i> <b>D3</b> and <i>loamy sand to sandy loam over clay</i> <b>G4</b>. And minor to limited areas of <i>shallow loamy sand over clay on calcrete</i> <b>B7</b> to <i>sand over clay</i> <b>G4</b> on low sandy rises.</p> <p><b>RTB</b> – slopes and rises with some vague drainage ways (slopes 1-4%).  <b>RTC</b> – rise and upper slopes with drainage ways (slopes 1-8%).  <b>RTL</b> – lower slopes with drainage ways (slopes 0.5-3%).</p>



**Detailed soil profile descriptions:****Main soils:**

- G4** *Loamy sand to sandy loam over clay* [Brown-Red Sodosol-Chromosol]  
Medium thickness to thin grey brown loamy sands to light sandy loams overlying red to brown to yellowish clay with abundant fine carbonate in the mid to lower subsoil. The subsoil clay usually contains significant amounts of sand. Profiles can contain significant amounts of hard carbonate rubble, and sometimes have slightly to moderately calcareous surfaces. Found in swales and other areas.
- D3** *Sandy loam to clay loam over red clay* [Red-Brown Chromosol-Sodosol-Dermosol]  
Thin to medium thickness grey brown to brown sandy loams, loams, sandy clay loams or clay loams overlying red to brown to yellowish clay with abundant fine carbonate in the mid to lower subsoil. Profiles can contain significant amounts of hard carbonate rubble, and sometimes have slightly to moderately calcareous surfaces. Typically found in flats, lows, depressions, and drainage depressions.
- B6-B7** *Shallow sandy loam to loamy sand over clay on calcrete* [Petrocalcic Red-Brown Chromosol-Dermosol]  
Thin to medium thickness grey brown to brown loamy sands, sandy loams, loams, sandy clay loams or clay loams overlying red to red brown clay, which is underlain by calcrete at shallow depth. Profiles can contain significant amounts of hard carbonate rubble, and sometimes have slight to moderately calcareous surfaces. **B6** soils have loamy to clay loamy surfaces; **B7** soils have sandy surfaces. Found in swales, some low dunes and sandy rises, and other areas.
- G3-G4** *Sand over clay* [Brown-Red Sodosol-Chromosol]  
Medium thickness to very thick sand overlying clayey subsoils. **G3** soils have thick to very thick topsoils; **G4** soils have medium thickness topsoils. Sandy subsurface layers are usually bleached. Subsoils are typically coarsely structured. Profiles are occasionally calcareous throughout, with moderate to slightly calcareous surfaces. Found on dunes.
- B2** *Shallow calcareous sandy loam on calcrete* [Petrocalcic Calcarosol]  
Grey brown to red brown calcareous sandy loam, clay loam or loamy sand, with loamy, clay loamy or sandy subsoils, and calcrete at shallow depth. Profiles are often only moderately calcareous. Profiles can contain significant amounts of hard carbonate rubble. Found on rises, plains and slopes.
- B3** *Shallow sandy loam on calcrete* [Petrocalcic Tenosol-Chromosol]  
Brown to red brown sandy loam, clay loam or loamy sand, with red brown to red loamy, clay loamy or sandy subsoils, and calcrete at shallow depth. Profiles can be slightly calcareous. Profiles can contain significant amounts of hard carbonate rubble. Found on rises, plains and slopes.

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

