

HRW Herrings Well Land System

Rising land dominated by carbonate-rich sandy deposits. There are extensive dunefield areas with sandy rises, and a relatively large salinised drainage depression which dissects the system.

Area: 29.7 km²

Landscape: The system consists of slopes and somewhat elevated plains, which are dissected by a relatively large salinised drainage depression. The drainage depression also cuts a pass through rises to the east, allowing areas further inland to be drained seaward. The system is underlain at depth by Permian age sediments associated with glacial activity (Crawford, A.R., 1965). These, and any other older sediments, are overlain calcareous loess (Woorinen Formation) which is calcreted in places. These sediments are exposed in some areas. However, the Woorinen Formation is largely blanketed by younger carbonate-rich coastal sands. These sands were deposited in very recent geological times and have been worked into sandy rises across the system. The sandy rises are sometimes jumbled, but are mostly roughly linear and orientated northwest-southeast. At the margins of the system wave-fronts of sand have formed. The wave-front in the very southeast of the system is quite high, and forms a broad arc which is different in orientation to the majority of other sandy rises.

Annual rainfall: 395 – 420 mm average

Main soils:

- A1** Highly calcareous loamy sand (around 51% of area)
- H1** Carbonate sand (around 32% of area)

Minor soils:

- A4** Calcareous sandy loam (around 6% of area)
- B2** Shallow calcareous sandy loam on calcrete (around 5% of area)
- B1** Shallow highly calcareous loamy sand on calcrete (approximately 3% of area)

Main features: Most soils have sandy textures. The soils on sandy rises have been formed by the reworking of sand, and are somewhat lighter textured, and less well developed than soils on the flats between sandy rises. The potential for wind erosion is moderately high on flats, and high on sandy rises. This is exacerbated by water repellent nature of these soils. Very careful surface management is needed to protect soils. The soils on sandy rises are dominantly composed of carbonate particles, while those on the flats are typically a mixture of carbonate and quartz particles but can also be dominantly composed of carbonate particles. Such highly calcareous soils have very low to low fertility. The high carbonate content of these soils leads to the restricted availability of a number of nutrients. The availability of phosphorus, manganese, zinc and iron is restricted. Typically, higher than normally recommended phosphorus fertilizer applications are needed for adequate crop production. Regular manganese applications are also necessary. Copper and cobalt are also normally deficient on such soils. The sandy nature of these soils also allows for the leaching of soluble nutrients, such as nitrogen and sulfur. Saline seepage affects the drainage depression areas in this system to the extent that they are highly to marginally saline. It is likely that many lower subsoils have raised salinity levels. Correspondingly, sodium levels are high in most soils, as evidenced by their dispersive natures. In sandy soils this does not adversely affect soil structure, however, amounts in subsoils may reach levels of toxicity which impede root growth. Calcrete layers occur under some soils, and some soils contain abundant hard carbonate rubble – these conditions restrict profile water holding capacity and hence productive potential.



Soil Landscape Unit summary: Herrings Well Land System (HRW)

SLU	% of area	Main features #
QEL	5.3	Land dominated by shallow calcareous soil on calcrete. Main soils: <i>shallow calcareous sandy loam on calcrete</i> B2 grading to <i>shallow highly calcareous loamy sand on calcrete</i> B1 . With some <i>calcareous sandy loam</i> A4 grading to <i>highly calcareous loamy sand</i> A1 . QEL – slopes with some drainage lows (slopes 0.5-2%).
SLL	6.7	Land dominated by soil formed in calcareous loess. Main soils: <i>calcareous sandy loam</i> A4 grading to <i>highly calcareous loamy sand</i> A1 . With some <i>shallow calcareous sandy loam on calcrete</i> B2 grading to <i>shallow highly calcareous loamy sand on calcrete</i> B1 . And some <i>carbonate sand</i> H1 on very low sandy rises. SLL – gently undulating elevated plains with approximately 10-20% very low sandy rises (slopes 0-1.5%).
YAL YAv YAy	11.0 57.5 4.7	Land dominated by carbonate-rich sandy soil. Main soils: <i>highly calcareous loamy sand</i> A1 grading to <i>carbonate sand</i> H1 on low sandy rises. YAL – elevated plains with approximately 25% low sandy rises (slopes 0-1%). YAv – slopes with 30-40% low sandy rises/sandy rises (slopes). YAy – slopes with approximately 15% low sandy rises (slopes 1-3%).
YDL YDW	6.0 1.4	Land dominated by carbonate-rich sandy soil. Main soils: <i>highly calcareous loamy sand</i> A1 grading to <i>carbonate sand</i> H1 on sandy rises. With <i>calcareous sandy loam</i> A4 , and <i>shallow highly calcareous loamy sand on calcrete</i> B1 grading to <i>shallow calcareous sandy loam on calcrete</i> B2 . YDL – slopes/elevated plains with 30-40% sandy rises (slopes 0-1.5%). YDW – drainage depression (slopes <1%, 3-4s).
ZA- ZB-	2.4 4.0	Saline drainage depressions. ZA- – salinised drainage depressions (slopes <1%). Main soils: various salinised soils underlain by calcrete: <i>gradational calcareous loam</i> A6 grading to <i>calcareous loam over clay</i> D3 , with some <i>shallow calcareous loam on calcrete</i> B2 and <i>shallow loam over clay on calcrete</i> B6 . Surface textures range from loam to clay loam, and possibly to light clay. Soils were seen to crack to the surface. ZB- – salinised drainage depression with approximately 10-20% low sandy rises (slopes <1%). Main soils: mostly saline variants of the following soils: <i>highly calcareous loamy sand</i> A1 possibly grading to some <i>calcareous sandy loam</i> A4 , and some <i>shallow highly calcareous loamy sand on calcrete</i> B1 grading to <i>shallow calcareous sandy loam on calcrete</i> B2 . And with <i>carbonate sand</i> H1 on low sandy rises.

Classes in the 'Soil Landscape Unit summary' table (eg. 2-1e, 3w, 2y, etc) describe the predominant soil and land conditions, and their range, found in Soil Landscape Units. The number '1' reflects minimal limitation, while increasing numbers reflect increasing limitation. Letters correspond to the type of attribute:

a - wind erosion e - water erosion f - flooding g - gullyng
r - surface rockiness s - salinity w - waterlogging y - exposure

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

- A1** *Highly calcareous loamy sand* [Supravescent-Shelly Calcarosol]
Moderate depth to deep grey loamy sand to light sandy loam. The soil is typically a mixture of carbonate and quartz particles but is often dominantly composed of carbonate particles. Profiles often contain abundant hard carbonate rubble in subsoil layers, and can be underlain by calcrete at moderate depth or more. Topsoil layers are usually strongly water repellent. Subsoil layers may be as heavily textured as clay loam in drainage depression areas.
- H1** *Carbonate sand* [Shelly Calcarosol]
Deep and loose grey carbonate sand. The soil is dominantly composed of carbonate particles. Topsoil layers are strongly water repellent. Found on sandy rises.



Minor soils:

- A4** *Calcareous sandy loam* [Regolithic Lithocalcic-Hypercalcic Calcarosol]
Grey brown medium thickness calcareous loamy topsoil grading to loamy or clay loamy subsoil with abundant fine carbonate. The surface layer is dominated by quartz particles. Profiles often contain abundant hard carbonate rubble. Subsoils are dispersive and strongly alkaline. These occur in areas not overlain by carbonate-rich sandy sediments.
- B2** *Shallow calcareous sandy loam on calcrete* [Petrocalcic Calcarosol]
Grey brown calcareous loamy soil with calcrete at shallow depth. The surface layer is dominated by quartz particles. Textures are usually sandy loam or loam, however, clay loams or even light clays may occur in upper drainage depression areas. Profiles often contain abundant hard carbonate rubble. These occur in areas not overlain by carbonate-rich sandy sediments. They may grade to shallow calcareous texture contrast soils in some upper drainage depression areas: *shallow loam over clay on calcrete* **B6**.
- B1** *Shallow highly calcareous loamy sand on calcrete* [Supravescent Petrocalcic Calcarosol]
Shallow grey loamy sand to light sandy loam on calcrete. The soil is usually a mixture of carbonate and quartz particles. Profiles are usually strongly water repellent.

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

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

