ORS Old Research Station Land System

A plateau surface area which is mildly dissected with drainage depressions (upper tributaries of Little Timber Creek and Timber Creek). The system is bordered to the south by a deeply dissected plateau area; to the west by a slightly lower less-well drained plateau area; to the east by slopes running down to a lower-lying plateau area; and to the north by slopes and gullies where the plateau drops steeply away along the Cygnet Fault-Line. This system is named after the old research station (about 7km east of Parndana) which is where much of the pasture and grazing research was conducted on the naturally low fertility ironstone soils of the central plateau for Kangaroo Island's soldier settlement scheme. The old research station is at the western edge of this system.

Area: 52.9 km^2

Annual rainfall: 565 – 665 mm average

Geology: The system consists mostly of Pliocene age regolith, comprising deeply weathered clayey sediments capped with ironstone gravel (or occasionally ferricrete - sheet or boulder laterite). Some areas of Pliocene-Quaternary age colluvium occur on some slopes and in some depression areas. These areas also consist of deeply weathered clayey sediments usually capped with ironstone gravel (sometimes ironstone is also occurs in the upper clayey subsoil). The deeply weathered clayey sediments are underlain by early Cambrian age Kanmantoo Group meta-sediments: Tapanappa Formation meta-sandstone, and undifferentiated Kanmantoo Group meta-sandstones. These rocks have near surface expression in places: at the sloping edge of the plateau adjacent to the steep slopes and gullies, and on lower slopes adjacent to drainage lines.

Topography: Mostly a gently undulating plateau surface. Slopes are generally from 0 - 3%. The steepest slopes reach to 10% on some slopes and lower slopes bordering drainage lines. The main part of the system is drained to the south by tributaries of Little Timber Creek and Timber Creek. These relatively low energy drainage lines all have at least some evidence of saline seepage.

Elevation: From 190 m in the very northwest of the system, to near 100 m at the central southern and southeast edges of the system. This plateau area has a general slope from the northwest to the southeast. Elevations are typically 130 m to 160 m in the west of the system, and 110 m to 140 m in the east.

Relief: Typically 10 m; sometimes over 20 m

Main Soils:

J2a	Ironstone soil
J2b	Colluvial ironstone soil

Minor Soils:

F2	Sodic texture contrast soil
K4a	Texture contrast soil on weathered rock
K4b	Stony texture contrast soil
J3	Shallow soil on ferricrete

Main Features: Arable plateau surfaces and some slopes. Topsoils are loamy. The main soils are loamy with ironstone gravel over clay. Ironstone gravel reduces fertility due to its ability to 'fix' phosphorus. Soil water holding capacity is also reduced by the presence of the gravel. The clayey subsoils which are occasionally sodic are relatively impermeable, resulting in waterlogged conditions in many soils over winter and spring. Acidic conditions regularly occur in topsoils and subsoils. Patches of saline seepage occur especially along drainage lines.

Soil Landscape Unit summary: Old Research Station Land System (ORS)

SLU	% of area	Main features #
CBZ	2.3	Mostly arable summit surface: with soils over weathering rock, and some ironstone soils. Main soils: stony texture contrast soil and texture contrast soil on weathered rock – stony to slightly stony loamy soils over clay **K4b**-**K4a** (*stony Brown Chromosol-Sodosol* and *Brown Chromosol*). With 10-40% ironstone soils **J2a**-**J2b** (*Ferric Brown Chromosol-Dermosol*). **CBZ** – summit surface (0-2%, 1-2e) Summary: the main issues are waterlogging, reduced fertility where ironstone gravel occurs due to phosphorous fixation, and stoniness.
CCO CCT	0.9 4.8	Mostly non-arable drainage depressions with lower slopes and drainage depression flats: with soils over weathering rock, and some deeper sodic soils. Main soils: stony texture contrast soil and texture contrast soil on weathered rock – stony to slightly stony loamy soils over clay **K4b**-**K4a** (*stony Brown Chromosol-Sodosol* and *Brown Chromosol*). With 10-40% sodic texture contrast soil – loamy soils over sodic clay **F2** (*Brown Sodosol*). With 0-5% shallow loamy soil with rock fragments and sometimes ironstone gravel, over rock or weathered rock **L1** (rocky Tenosol-Rudosol). **CCO** – lower slopes and drainage depression with <10% saline seepage (slopes 1-10%, 3e 3^{+}s) **CCT** – lower slopes and drainage depression with 10-50% saline seepage (slopes 1-10%, 3e, 4-3*s) Summary: these drainage depressions are mostly non-arable due to the risk of flooding and wetness/waterlogging; while other issues include saline seepage, the risk of water erosion, stoniness, and the many sodic subsoils.
HCO HCT	0.3 1.6	Mostly non-arable drainage depressions with drainage depression flats and some lower slopes: mostly with sodic soils, and some soils over weathering rock. Main soils: sodic texture contrast soil – loamy soils over sodic clay **F2** (*Brown Sodosol*). With 10-40% texture contrast soil on weathered rock with stony texture contrast soil – slightly stony to non-stony soil over weathering rock, with some stony soils over weathering rock **K4a**-**K4b** (*Brown Chromosol* with *stony Brown Chromosol-Sodosol*). With 0-10% ironstone soils **J2a**-**J2b** (*Ferric Brown Chromosol-Dermosol*). **HCO** – drainage depression and lower slopes with <10% saline seepage (slopes 2-6%, 2-3e, 3^{+}s) **HCT** – drainage depression and lower slopes with 10-50% saline seepage (slopes 2-6%, 2-3e, 4-3*s) Summary: these drainage depressions are mostly non-arable due to the risk of flooding and wetness/waterlogging; while other issues include saline seepage, the risk of water erosion, and the sodic nature of many subsoils.
FWB FWZ	0.4 6.8	Mostly arable summit/plateau surfaces and slopes: with ironstone soils, some soils formed over weathering rock, and some shallow soils over ferricrete. Main soils: loamy ironstone soils **J2a**-**J2b** (*Ferric Brown Chromosol-Dermosol*). With approximately 10-20% texture contrast soil on weathered rock with stony texture contrast soil – slightly stony, with some stony, loamy soil over clay on weathering rock **K4a**-**K4b** (*Brown Chromosol* with *stony Brown Chromosol-Sodosol*). With approximately 10% loamy shallow soil over ferricrete **J3** (*Petroferric Tenosol*).

		FWB – slopes (1-3%, 2e) **FWZ** – summit/plateau surfaces (0-2%, 1-2e) Summary: the main issues are waterlogging, reduced fertility where ironstone gravel occurs due to phosphorous fixation, acidic topsoils and subsoils, and some stoniness.
FRB FRC FRE FRL FRZ	4.6 2.4 0.3 0.3 62.0	Mostly arable summit/plateau surfaces, slopes and depressions: with ironstone soils. Main soils: loamy ironstone soils **J2a**-**J2b** (*Ferric Brown Chromosol-Dermosol*). With 0-10% texture contrast soil on weathered rock **K4a** (*Brown Chromosol*). With 0-10% shallow soil on ferricrete **J3** (*Petroferric Tenosol*). **FRB** – slopes (1-3%, 2e) **FRC** – slopes (3-5%, 3-2e) **FRE** – depressions, often at heads of creeks (slopes 0-1%, 1e) **FRL** – slopes with <10% saline seepage (slopes 1-3%, 2-1e, 2-3s) **FRZ** – summit/plateau surfaces (slopes 0-1.5%, 1e) Summary: the main issues are waterlogging, reduced fertility with ironstone gravel due to phosphorous fixation, acidic topsoils and subsoils, and some water erosion risk on sloping land.
FVB FVC FVL FVM FVZ	0.7 0.7 8.7 1.5 0.5	Mostly arable slopes and plateau/summit surfaces: with ironstone soils, and some soils over weathering rock. Main soils: loamy ironstone soils **J2a**-**J2b** (*Ferric Brown Chromosol-Dermosol*). With 10-40% texture contrast soil on weathered rock with stony texture contrast soil – slightly stony to non-stony, with some stony, loamy soil over clay on weathering rock **K4a**-**K4b** (*Brown Chromosol* with *stony Brown Chromosol-Sodosol*). **FVB** – slopes (1-4%, 2-3e) **FVC** – slopes (3-10%, 3-2e) **FVL** – slopes with <10% saline seepage (slopes 1-4%, 2-3e, 2-1s) **FVM** – slopes with <10% saline seepage (slopes 3-10%, 3-2e, 2-1s) **FVZ** – summit/plateau surfaces (slopes 0-1%, 1e) Summary: the main issues are waterlogging, reduced fertility in soils with ironstone gravel due to phosphorus fixation, acidic topsoils and subsoils, some water erosion risk on sloping land, and some stoniness.
FXZ	0.7	Mostly arable to semi-arable summit/plateau surfaces: with ironstone soils, and some shallow soils over ferricrete. Main soils: loamy ironstone soil **J2a** (*Ferric Brown Chromosol-Dermosol*). With 10-40% loamy shallow soil on ferricrete **J3** (*Petroferric Tenosol*). **FXZ** – summit/plateau surfaces (0-1.5%, 1e) Summary: the main issues are waterlogging, reduced fertility with ironstone gravel due to phosphorous fixation, reduced waterholding capacity where shallow soils occur, acidic topsoils and subsoils, and some stoniness (ferricrete fragments).
FxU	0.4	Semi-arable summit/plateau surfaces: with shallow soils over ferricrete, and some ironstone soils. Main soils: loamy shallow soil on ferricrete **J3** (*Petroferric Tenosol*). With 10-40% loamy ironstone soil **J2a** (*Ferric Brown Chromosol-Dermosol*). **FxU** – summit/plateau surfaces with approximately 50% scalding (slopes 0-1%, 1e). Borrow-pit area. Summary: the main issues are reduced waterholding capacity due to shallow soils, stoniness (ferricrete fragments), waterlogging, reduced fertility due to phosphorous fixation by ironstone, acidic soils, and loss of topsoil due to removal/erosion.

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 - gullying
r - surface rockiness	s - salinity	w - waterlogging	y - exposure

Detailed soil profile descriptions:

Main Soils:

J2a Ironstone soil (*Ferric Brown Chromosol-Dermosol*). Thick to medium thickness sandy loam to loam, with a sub-surface layer of sandy loam to light sandy clay loam which is occasionally bleached and includes ironstone gravel; on or sometimes grading into yellow-brown to olive-brown clay which is occasionally sodic and usually has some red and olive mottles. The clay usually has weak to moderate subangular blocky or polyhedral primary structure which breaks down to <2 mm or 2 - 5 mm lenticular secondary structure. The clay usually textures as a 'short' clay, that is, it ribbons as would a light clay or clay loam but is obviously more clayey. Soils with bleached layers and sodic clayey subsoils occur in depressions, at heads of creeks or gullies, and on some lower slopes. Note: a few Bleached-Ferric Chromosols and Ferric Sodosols occur, as do a few Ferric Kandosols. Found on plateau surfaces: crests, slopes, flats and depressions. [The unbleached versions equate to the 'Seddon Gravelly Soil' of Northcote.]

J2b Colluvial ironstone soil (*Ferric Brown Chromosol-Dermosol*). Thick to medium thickness sandy loam, loam, light sandy clay loam or even a sandy loamy peat, with a sub-surface layer of light sandy loam to fine sandy clay loam which is occasionally bleached and includes ironstone gravel; on or grading into yellow-brown or olive-brown clay or even light clay with ironstone nodules or sometimes ironstone gravel. The clay usually has red and olive mottles. The clay often has subangular blocky or polyhedral structure which usually breaks down to <2 mm or 2 - 5 mm lenticular peds. The clay is usually a 'short' clay, ribboning as for a light clay or clay loam or less, but obviously being more clayey than that. (These soils are the result of colluvial/alluvial depositional processes as evidenced by ironstone nodules occurring in the upper clayey subsoil.) Note: a few Ferric Kandosols may occur. Found on plateau surfaces: crests, slopes and flats.

Note: the above soils are very similar, except that the latter is of colluvial/alluvial origin and has ironstone nodules or ironstone gravel in the clayey subsoil as well as in the topsoil layers, and is often found in lower-level situations.

Minor Soils:

F2 Sodic texture contrast soil (*Brown Sodosol*). Thick to medium thickness sandy loam to loam, with a sub-surface layer of clayey sand to sandy clay loam which is often bleached and sometimes includes some ironstone nodules; on or grading into yellow-brown to olive-brown mostly sodic clay and usually with red and olive mottles. 'Short' clays occur. Note: some Kandosols and Dermosols occur. Found on plateau surfaces: ill-defined drainage depressions, drainage depressions and some lower slopes.

K4a Texture contrast soil on weathered rock (*Brown Chromosol*). Thick to medium thickness sandy loam to loam, with a sub-surface layer of sandy loam which is sometimes bleached and sometimes includes ironstone gravel; on yellow-brown to olive-brown clay, usually with red and olive mottles; over weathered meta-sandstone rock. 'Short' texturing subsoil clay often occurs. Note: some Sodosols and Dermosols-Kandosols would occur. Found on plateau surfaces, especially edge areas and slopes.

K4b Stony texture contrast soil (*stony Brown Chromosol-Sodosol*). Thick to medium light sandy loam to sandy clay loam, with a sub-surface layer of sandy loam to sandy clay loam which is often bleached and includes meta-sandstone and/or quartz fragments, and often ironstone nodules or even ironstone gravel; on yellow-brown, brown or olive-brown often sodic light clay to clay which usually has red and olive mottles; over weathered meta-sandstone or occasionally other weathered rock. Found on plateau edges and slopes down to creeks (especially lower slopes).

J3 Shallow soil on ferricrete (*Petroferric Tenosol*). Sandy loam to loam over a layer of light sandy loam to sandy loam which is sometimes bleached and includes ironstone gravel; overlying ferricrete (boulder or sheet laterite). Mottled clayey substrate underlies the ferricrete layer. Found on plateau surfaces.

Further information: DEWNR Soil and Land Program