BIC Birchmore Land System

This system forms the eastern most part of the main Kangaroo Island plateau. The system includes plateau surfaces, plains, slopes, drainage depressions (which are often saline), and several saline lagoonal depressions. Drainage depression areas include the alluvial valley flats of Timber Creek and Little Timber Creek. To the west is a somewhat higher dissected plateau area. To the south and south-east is the low-lying Murray Lagoon 'old lake floor' area; and to the east is the lowland lagoonal plain area. To the north-west are the slopes and gullies of the main plateau escarpment; to the north and north-east are the 'gilgaied' uplands of the Haines Plateau area; and at the very north this system just touches on the Cygnet River lowland plains area. This system is named after Birchmore Lagoon which is situated in the north of the system.

Area: 68.0 km^2

Annual rainfall: 530 – 585 mm average

Geology: Most of the area is underlain by early Cambrian age Kanmantoo Group meta-sandstones. This rock sometimes has near surface to surface exposure, especially on lower slopes. However, the rock is mostly covered by Pliocene-Quaternary age colluvium, which consists of deeply weathered clayey sediments, often overlain with ironstone gravel. This clay is derived from weathered Kanmantoo Group rocks. There are recent deposits of clayey alluvium in drainage depressions and on some plains; while a few areas have deposits of cracking clay. The lagoonal/saline depressions consist of lacustrine clayey and marly deposits. Areas of recent siliceous sand deposition occur as lunettes and a few dunes on the north and east sides of Birchmore Lagoon. The sand is most likely derived from the lagoon surface.

Topography: Gently undulating rises, with some undulating rises and gently undulating plains. This is a dissected plateau and plains area with many drainage depressions. It forms the eastern most part of the central Kangaroo Island plateau. Drainage runs east and south-east into the White and Murray Lagoon basins; while there is some localised drainage east and north-east into Birchmore Lagoon; and minor drainage northward onto the Cygnet River lowland plains. Drainage depressions are usually salinized to some extent. There are several saline lagoonal depressions. Slopes range from 0% on some plateau summit areas and flats to just over 10% on a few steeper slopes. Typical grades are from 0% to 5%.

Elevation: From just over 80 m in the central west, to 30 m in the very north, and near 20 m in the south and south-east.

Relief: Typically around 10 m. Reaches over 20 m on the steeper slopes

Main Soils:

J2a	Bleached ironstone soil
J2b	Ironstone soil
G4-**G3**	Sandy to loamy sodic texture contrast soil
F2a-**F1**	Loamy sodic texture contrast soil

Minor Soils:

K4a	Stony texture contrast soil
K4b	Texture contrast soil over weathering rock
I1-**H3**	Deep sands
F2b-**J1**	Cracking texture contrast soil
B2	Shallow soil on calcrete

Main Features: The system is mostly arable. Topsoils are mostly loamy; with some sandy. The main soils are sandy loams with a sub-surface layer of clayey to loamy sand, often with ironstone gravel, on sodic clay. Saline seepage occurs, especially in drainage depressions and on lower slopes. The low permeability of the subsoil clays leads to poor drainage and increased runoff. This also reduces soil water storage leading to reduced soil water available for plant use. Water erosion is a risk on slopes. Ironstone causes reduced fertility as it 'fixes' phosphorus; as well as reducing soil waterholding capacity. Some soils have fine carbonate in their lower subsoils, especially in lower-lying areas.

Soil Landscape Unit summary: Birchmore Land System (BIC)

SLU	% of area	Main features #
JRO	1.0	Arable depressions of alluvial clayey material. Main soils: cracking texture contrast soil – loamy soil over sodic and cracking clay **F2b** (*Vertic Brown Sodosol*). With 10-20% cracking clay soils **E3** (Vertosol) **JRO** – depression with <10% saline seepage (3-4s) Summary: the main issues are waterlogging due to situation and subsoil physical condition, and saline seepage.
PnO PnU	4.4 4.5	Arable to semi-arable drainage depressions. These depressions are mostly alluvial depositions in valley flats; but include very lower slopes with soils formed over weathering rock; and steeper/erosional side tributaries. These areas include the more sluggishly drained and less rocky sections of Timber Creek and Little Timber Creek (when compared to areas further upstream). Also included is a depositional drainage flat at head of one of the creeks. Main soils: sandy to loamy sodic texture contrast soil **G4**-**G3** (*Sodosols*). With 10-40% stony texture contrast soil **K4a** (*stony Sodosol*) and texture contrast soil over weathering rock **K4b** (*Sodosol*). **PnO** – drainage depression with <10% saline seepage (3-2^{o}s) **PnU** – drainage depression with almost 50% saline seepage (4-5*s) Summary: the main issues are waterlogging, subsoil sodicity, saline seepage, and the potential for flooding.
PbK PbO PbU	5.7 1.2 0.2	Arable plains, slight slopes, low-lying areas, and drainage depressions. These are primarily alluvial areas. Main soils: sandy to loamy sodic texture contrast soil – sandy to thick sandy soil, maybe some loamy, over sodic clay **G4**-**G3** (*Sodosols*). With 0-5% deep sands **I1**-**H3** (*Podosol-Tenosol*) **PbK** – gently undulating plains with <10% saline seepage (2-3s) **PbO** – low-lying alluvial areas and drainage depression with <10% saline seepage (3-4s) **PbU** – drainage depression with marginal salinity (4s) Summary: the main issues are waterlogging and saline seepage especially in drainage depressions, subsoil sodicity, and some water repellence in sandy topsoils. Flooding is also a risk in the '**PbU**' drainage area.
CBC CBM CBN CBZ	0.8 0.6 0.5 0.3	Semi-arable to arable summit surfaces and slopes. Main soils: stony texture contrast soil **K4a** (*stony Sodosol-Chromosol*) and texture contrast soil over weathering rock **K4b** (*Ferric Brown Sodosol*). With 10-40% bleached ironstone soil **J2a** (*Ferric Brown Sodosol*). **CBC** – slopes (4-10%, 3e) **CBM** – slopes with <10% saline seepage (slopes 5-10%, 3e, 3-2s*) **CBN** – slopes with <10% saline seepage (slopes 8-12%, 4-3e, 3-2s) **CBZ** – gently undulating summit surfaces.

		Summary: the main issues are water erosion risk on slopes, fertility maintenance especially in soils with ironstone gravel, raised subsoil salinity levels in some areas, subsoil sodicity, some stoniness, and some water repellence in sandy topsoils.
CCO	1.8	Semi-arable creek bed and slopes. Main soils: stony texture contrast soil **K4a** (*stony Sodosol-Chromosol*) and texture contrast soil over weathering rock **K4b** (*Ferric Brown Sodosol*). With 10-40% sandy to loamy sodic texture contrast soil **G4**-**G3** (*Sodosol*). **CCO** – creek bed and slopes with <10% saline seepage (slopes 5-10%, 3e, 3-2ºs) Summary: the main issues are water erosion risk, stoniness, waterlogging and subsoil sodicity, fertility maintenance especially in soils with ironstone gravel, and some water repellence in sandy topsoils.
ZO-	0.3	Non-arable waterlogged/saline depressions. Includes the low-lying head area of a creek. Main soils: sandy to loamy sodic texture contrast soil **G4**-**G3** (*Sodosols*). **ZO-** – marginally saline depression (4s, 5w) Summary: non-arable due to wetness and marginal salinity.
ZA- ZB-	0.2 2.1	Non-arable saline depressions. Main soils: sandy to loamy sodic texture contrast soil – loamy to sandy soil over sodic clay with fine carbonate in lower subsoil or subsoil, some soils even calcareous throughout **G4**-**G3** (*Grey Sodosol*). With ('ZB' area only) 10-30% stony texture contrast soil with fine carbonate in lower subsoil **K4a** (*stony Sodosol*) and shallow soil on calcrete **B2** (*Petrocalcic Calcarosol*). **ZA-** – saline depressions (5s) **ZB-** – saline drainage depression area (7-5s) Summary: non-arable due to highly saline conditions and the potential for flooding.
ZQ- ZR- ZU-	0.7 1.4 1.7	Non-arable lagoons. Main soils: sandy to loamy sodic texture contrast soil with fine carbonate in lower subsoil **G4**-**G3** (*Grey Sodosol*). **ZQ-** – lagoon with melaleuca (5s) **ZR-** – lagoon with samphire, melaleuca, and bare patches (7-5s) **ZU-** – central Birchmore Lagoon area, often inundated. Summary: areas highly saline and subject to seasonal inundation.
ZL4 ZL6 ZL7 ZL8	0.4 0.2 0.4 0.3	Non-arable, semi-arable and arable lunettes. A couple of these 'lunettes' are really sand dunes formed from reworked sand and are removed from the lagoon edge. Main soils: deep sands **I1**-**H3** (*Podosol-Tenosol*) on sandy lunettes. And sandy to loamy sodic texture contrast soil with fine carbonate in lower subsoil **G4**-**G3** (*Sodosols*) on clay based lunettes. **ZL4** – clay based lunette (2-5m) **ZL6** – low sandy lunette (1-2m) **ZL7** – sandy lunette (2-5m) **ZL8** – high sandy lunette (approx. 10m) Summary: the main issues are infertility, wind erosion potential, and water repellence due to the sandy nature of the majority of these soils.
FBA	0.4	Arable plains. Main soils: bleached ironstone soil **J2a** (*Ferric Brown Sodosol*). With 10-40% cracking texture contrast soil with ironstone gravel **J1** (*Vertic Ferric Brown Sodosol*). **FBA** – level to gently undulating plain. Summary: the main issues are subsoil physical condition, fertility maintenance due to phosphorous fixation in soils with ironstone gravel, some water repellence in sandy topsoils, and sodic subsoils.
FGA	3.8	Arable plains, slopes and depressions.

FGB FGE	2.4 0.5	Main soils: bleached ironstone soil – medium thickness to thick sandy soil with ironstone over sodic clay **J2a** (*Ferric Brown Sodosol*). **FGA** – gently undulating plains. These areas have thick ironstone gravel and some patches of ferricrete (sheet or boulder laterite). **FGB** – slopes (1.5-3%, 2e) **FGE** – depression area. Summary: the main issues are fertility maintenance due to phosphorous fixation by ironstone gravel, water repellence due to sandy topsoils, waterlogging especially in depression area, and sodic subsoils.
FFA FFB FFC FFK FFL FFM FFZ	20.7 8.3 1.7 7.1 12.0 2.1 2.0	Arable plains, slopes and summit surfaces. Main soils: bleached ironstone soil **J2a** (*Ferric Brown Sodosol*). 'FFK' areas often have soils containing less ironstone than other areas. **FFA** – level to gently undulating mid-level plains **FFB** – slopes (1-3%, 2-1e) **FFC** – slopes (2-7%, 3-2e) **FFK** – level to gently undulating plains with <10% saline seepage (2-3s) **FFL** – slopes with <10% saline seepage (slopes 1-4%, 2-1e, 2-3s) **FFM** – slopes with <10% saline seepage (slopes 3-6%, 3-2e, 2-3s) **FFZ** – level to gently undulating plateau summit surfaces (0-1%) Summary: the main issues are fertility maintenance due to phosphorous fixation by ironstone gravel, some water erosion risk on slopes, waterlogging and minor saline seepage in lower-lying areas, some water repellence in sandy topsoils, and sodic subsoils.
FJA FJB FJK FJL FLM FLO FLZ	0.9 0.4 0.5 0.5 1.9 0.1 3.2	Arable slopes, depressions, plains and summit surfaces. Main soils: bleached ironstone soil **J2a** (*Ferric Brown Sodosol*). With 10-40% texture contrast soil over weathering rock **K4a** (*Ferric Brown Sodosol*) and stony texture contrast soil **K4b** (*stony Ferric Sodosol-Chromosol*). 'FJZ' areas often have very abundant and thick ironstone gravel (**J2**). **FJA** – plain (slopes 0-1%, 1e) **FJB** – slope (2-3%, 2e) **FJK** – level to gently undulating plains (1-2e) **FJL** – slopes with <10% saline seepage (slopes1-4%, 2-1e, 2-3s) **FJM** – slopes with <10% saline seepage (slopes 3-6%, 3-2e, 2-3s) **FJO** – low-lying plain with <10% saline seepage (3s) **FJZ** – level to gently undulating plateau summit surface (1-2e) Summary: the main issues are fertility maintenance due to phosphorous fixation by ironstone gravel, waterlogging in lower lying areas, some raised subsoil salinity levels, some water erosion risk on slopes, some water repellence in sandy topsoils, and sodic subsoils.
FRA FRB FRL	0.6 0.9 1.3	Arable plains and slopes. Main soils: ironstone soil - loamy soil with ironstone over clay **J2b** (*Ferric Chromosol-Sodosol*). With 0-10% stony texture contrast soil **K4a** (*stony Ferric Sodosol-Chromosol*) and/or texture contrast soil over weathering rock **K4b** (*Ferric Brown Chromosol-Sodosol*). **FRA** – level to gently undulating plains. **FRB** – slopes (1-3.5%, 2-1e) **FRL** – slopes with <10% saline seepage (1-3.5%, 2-1e, 2s) Summary: the main issues are fertility maintenance due to phosphorous fixation by ironstone gravel, and waterlogging in lower-lying areas.

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 Bleached ironstone soil (*Ferric Brown Sodosol*). Medium thickness to thick loamy sand, sandy loam, or light loam with a bleached sub-surface layer of loamy sand, clayey sand, or light sandy loam, and including ironstone gravel which is sometimes very abundant; over yellow-brown or olive-brown sodic clay with red and olive mottles. Occasionally with weathered rock in the lower subsoil. Found on crests, slopes, flats, and in some drainage depression areas.

J2b Ironstone soil (*Ferric Brown Chromosol-Sodosol*). Medium thickness to thick light sandy loam or loam, with a sub-surface layer of clayey sand to loam, and including ironstone gravel; on yellow-brown clay with red and olive mottles which is sometimes sodic. [Northcote's Seddon Gravelly Soil]. Basically a non-bleached, usually heavier textured version of the soil described above. Found on some crests, slopes and flats.

G4-G3 Sandy to loamy sodic texture contrast soil (*Brown-Grey-Black Sodosol*). Medium thickness to thick loamy sand or light sandy loam, usually with a bleached sandy sub-surface layer, and sometimes with ironstone nodules; over yellow-brown, olive-brown, olive or grey sodic clay with olive, grey, and sometimes red mottles. Often with fine carbonate in lower subsoil (and can even be calcareous throughout in lagoonal areas). Found on flats, slopes, drainage depressions, a few lunette slopes, and lagoons. (Grey Sodosol are found in lagoons.)

F2a-F1 Loamy sodic texture contrast soil (*Brown Sodosol*). Medium thickness to thick sandy loam or light loam, with a sub-surface layer of sandy loam or light sandy loam which is usually bleached, and often with ironstone nodules; over yellow-brown or olive-brown sodic clay with olive, grey, and often red mottles. Occasionally with fine carbonate in lower subsoil. Basically a heavier textured version of the soil described above. Found on some slopes and in some drainage depression areas.

Minor Soils:

K4a Stony texture contrast soil (*stony Brown-Red Sodosol-Chromosol*). Thin to medium thickness sandy loam or light loam, with a sub-surface layer of clayey sand to sandy loam which is usually bleached, and including meta-sandstone fragments, possibly some quartz fragments, and sometimes some ironstone nodules or even ironstone gravel; over olive-brown, yellow-brown, or even red-brown, usually sodic clay to clay loam; on weathering meta-sandstone. Found on lower slopes, drainage depressions, some crests, and a flat in the saline depression north of Birchmore Lagoon.

K4b Texture contrast soil over weathering rock (*Ferric Brown Sodosol* or *Brown Sodosol*). Medium thickness to thick loam to light sandy loam, with a sub-surface layer of clayey sand to sandy loam which is usually bleached, and often includes ironstone gravel; over olive-brown, yellow-brown or olive, usually sodic clay; on weathering meta-sandstone. Found on lower slopes, drainage depressions, and some crests.

I1-H3 Deep sands (*Podosol-Tenosol*). Loamy sand to sand over bleached sand; on sandy subsoil, usually with accumulations of iron and organic compounds. Fine carbonate often occurs at depth. Found on lunettes.

F2b-J1 Cracking texture contrast soil (*Vertic Brown Sodosol*). Thin to medium thickness loamy soil, with a sub-surface layer of loamy to sandy soil which is often bleached, and sometimes includes ironstone nodules or ironstone gravel; over olive-brown or olive sodic and cracking clay, usually with fine carbonate in the lower subsoil. Found in some depressions.

B2 Shallow soil on calcrete (*Petrocalcic Calcarosol*). Shallow, calcareous sandy loam with calcrete fragments; on calcrete. Found on flats in the saline depression north of Birchmore Lagoon.

Further information: DEWNR Soil and Land Program