WAW Warrawee Land System

A mid-level dissected plateau area. The land system is bordered to the west by Wittow Creek, beyond which is a similar mid-level dissected plateau area; to the north there is the higher-level central plateau area; and to the south is Murray Lagoon and the Lake Ada lowland area. Between Murray Lagoon and the Lake Ada area a finger of this system reaches to the southern calcreted remnant dune area. The land system is named after a homestead which is situated in the central-eastern part of this land system.

Area: 56 km^2

Annual rainfall: 575 – 625 mm average

Geology: Most of the area is Pliocene-Quaternary age colluvium, consisting of deeply weathered clay usually with a capping of ironstone gravel. Below the deeply weathered clay are early Cambrian age Kanmantoo Group meta-sandstones, which have near surface expression in places, particularly on the slopes along creeklines. Some drainage depression flats have deposits of Quaternary age alluvium consisting of sandy and loamy deposits over clay.

Topography: A dissected plateau area of gently undulating to undulating rises. Drainage is to the south via numerous creeklines into Murray Lagoon or the Lake Ada lowland area. The Eleanor River cuts through this system on its journey to the Lake Ada lowland area. Drainage depressions are all salinized to some extent. Slopes are generally from 0-8% with the steepest reaching 15-20% on slopes along a few creeklines and on a slope at the southern plateau edge.

Elevation: Highest elevations reach about 80m in the central-north and north-west of the system. Lowest elevations are near 20m on the lower slopes in the south-east of the system bordering Murray Lagoon, and 30m on the lower slopes in the south and south-west of the system bordering the lake Ada lowland area.

Relief: Typically 10 - 20m

Main Soils:

J2-J1	Ironstone soil
K4-D7	Texture contrast soil over weathered rock

Minor Soils:

G3-F1	Sodic texture contrast soil
J3	Shallow soil on ferricrete
J2a-J1a	sandy ironstone soil

Main Features: Arable plateau surfaces and slopes with non-arable drainage lines. Topsoils are mostly loamy, while a few sandy areas occur. The main soils are loamy with ironstone gravel over clay. Areas of stony soils occur, mostly on the slopes adjacent to drainage lines. Ironstone gravel reduces fertility due to its ability to 'fix' phosphorus. The clayey subsoils, which are often sodic are relatively impermeable, resulting in waterlogged conditions in many soils over winter and spring. Acidic conditions regularly occur in topsoils and also in subsoils, especially in soils with ironstone gravel. Patches of saline seepage occur especially in drainage depressions. Fine carbonate occurs in the lower subsoil of a number of soils, particularly in drainage lines and on lower slopes.

Soil Landscape Unit summary: Warrawee Land System (WAW)

SLU	% of area	Main features #
CBA CBC CBK CBL CBM CBMa CBN CBZ	0.4 0.4 0.7 1.0 0.6 0.6 0.4 4.5	Mostly arable plateau/summit surfaces, low-lying and mid-level plains, and slopes: with soils over weathering rock and some ironstone soils. Main soils: texture contrast soil over weathered rock – loamy slightly stony to stony topsoil over clay which is usually sodic on weathering rock **K4**-**D7** (*Brown Sodosol-Chromosol*). With 10-40% ironstone soil – loamy soil with ironstone gravel over usually sodic clay **J2**-**J1** (*Ferric Brown Sodosol-Chromosol*). **CBA** – mid-level plains (0-1%, 1e) **CBC** – slopes (3-6%, 3e) **CBK** – low-lying and mid-level plains with <10% saline seepage (slopes 0-2%, 1-2e, 3s) **CBL** – slopes with <10% saline seepage (slopes 2-5%, 2-3e, 2-3s) **CBM** – slopes with <10% saline seepage (slopes 2-10%, 3-2e, 2-3s) **CBMa** – slopes with <10% saline seepage (slopes 6-12%, 3-4e, 3s): with mostly sandy surface soils? **CBN** – slopes with <10% saline seepage (slopes 10-13%, 4e, 2-1s) **CBZ** – plateau/summit surfaces (slopes 0-2%, 1-2e) Summary: the main issues are water erosion potential on sloping land, some waterlogging, some stoniness, some areas with raised subsoil salinity levels, reduced fertility where ironstone gravel occurs due to phosphorous fixation, acidic topsoils and many to some acidic subsoils, and relatively impermeable clayey subsoils.
DRN DRO DRT DRTr	0.6 1.1 4.3 1.0	Mostly non-arable drainage depressions and slopes: with soils over weathering rock. Main soils: texture contrast soil over weathered rock – loamy stony to slightly stony topsoil over sodic clay on weathering rock **D7**-**K4** (*Brown Sodosol-Chromosol*). With approximately 10% ironstone soil – loamy soil with ironstone gravel over sodic clay **J1**-**J2** (*Ferric Brown Sodosol-Chromosol*). With approximately 10% sodic texture contrast soil – loamy to sandy soil over sodic clay in drainage depression flats and on some lower slopes **F1**-**G3** (*Brown Sodosol*). **DRN** – slopes and drainage depression with <10% saline seepage (slopes 5-20%, 4e, 2-3s) **DRO** – lower slopes and drainage depression with <10% saline seepage (slopes 2-12%, 3e, 3^{o}s-3^{+}s) **DRT** – lower slopes and drainage depression with 10-50% saline seepage (slopes 2-12%, 3e, 4-3*s) **DRTr** – lower slopes and drainage depression with 10-50% saline seepage (8-15%, 4e, 4-3*s). Summary: the main issues are waterlogging/wetness, stoniness, the risk of water erosion, some saline seepage, the risk of flooding in drainage depressions, and relatively impermeable clayey subsoils.
DWO DWT	1.3 2.6	Mostly non-arable lower slopes and drainage depressions: with soils over weathering rock and some ironstone soils. Main soils: texture contrast soil over weathered rock – loamy stony to slightly stony topsoil over sodic clay on weathering rock **D7**-**K4** (*Brown Sodosol-Chromosol*). With 10-40% ironstone soil – loamy soil with ironstone gravel over sodic clay **J1**-**J2** (*Ferric Brown Sodosol-Chromosol*). With 0-10% sodic texture contrast soil – loamy to sandy soil over sodic clay **F1**-**G3** (*Brown Sodosol*). **DWO** – lower slopes and drainage depression with <10% saline seepage (slopes 2-8%, 3e, 3^{+}s) **DWT** – lower slopes and drainage depression with 10-50% saline seepage (slopes 2-8%, 3e, 4-3*s) Summary: the main issues are wetness/waterlogging, stoniness, the risk of water erosion, saline seepage, the risk of flooding in drainage depressions, and relatively impermeable sodic clayey subsoils.
PnO PnU	0.7 2.8	Mostly non-arable drainage depression flats/upper reaches of creeks, and lower slopes: with loamy to sandy topsoils over sodic clay and some soils over weathering rock. Main soils: sodic texture contrast soil – loamy to sandy soil over sodic clay **F1**-**G3** (*Brown Sodosol*). With 10-40% texture contrast soil over weathered rock – loamy stony to slightly stony topsoil over sodic clay on weathering rock **D7**-**K4** (*Brown Sodosol-Chromosol*). With approximately 10% ironstone soil – loamy soil with ironstone gravel over sodic clay **J1**-**J2** (*Ferric Brown Sodosol-Chromosol*). **PnO** – drainage depression flats and lower slopes with <10% saline seepage (slopes 1-4%, 2e, 4-

		3s) **PnU** – drainage depression flats and lower slopes with approximately 50% saline seepage (slopes 0-5%, 2-3e, 4-5*s) Summary: the main issues are wetness/waterlogging, the risk of flooding, saline seepage, some stoniness, the risk of water erosion, and relatively impermeable sodic clay subsoils.
PoB PoE	0.5 1.5	Mostly arable depressions and slopes: with loamy to sandy topsoils over sodic clay and some ironstone soils. Main soils: sodic texture contrast soil – loamy to sandy soil over sodic clay **F1**-**G3** (*Brown Sodosol*). With 10-40% ironstone soil – loamy soil with ironstone gravel over sodic clay **J1**-**J2** (*Ferric Brown Sodosol-Chromosol*). With 0-10% texture contrast soil over weathered rock – loamy stony to slightly stony topsoil over sodic clay on weathering rock **D7**-**K4** (*Brown Sodosol-Chromosol*). **PoB** – slopes (1-3%, 2e) **PoE** – slight depression (slopes 0-1.5%, 1e) Summary: the main issues are some waterlogging, relatively infertile topsoils especially when sandy, relatively impermeable sodic clay subsoils, and reduced fertility where ironstone gravel occurs due to phosphorous fixation..
PkU	0.3	Mostly a non-arable drainage depression flat: with loamy to sandy topsoils over sodic clay. Main soils: sodic texture contrast soil – loamy to sandy soil over sodic clay **F1**-**G3** (*Brown Sodosol*). With 0-10% texture contrast soil over weathered rock – loamy stony to slightly stony topsoil over sodic clay on weathering rock **D7**-**K4** (*Brown Sodosol-Chromosol*). **PkU** – drainage depression flat at head of creek with 10-50% saline seepage (slopes 0-1%, 1e, 4-3*s) Summary: the main issues are wetness, the risk of flooding, saline seepage, and relatively impermeable sodic clay subsoils.
FUK FUO	0.2 1.3	Mostly arable depressions and low-lying plains: with ironstone soils, and some other soils with loamy to sandy topsoils over sodic clay. Main soils: ironstone soil – loamy soil with ironstone gravel over sodic clay **J1**-**J2** (*Ferric Brown Sodosol-Chromosol*). With 10-40% sodic texture contrast soil – loamy to sandy soil over sodic clay **F1**-**G3** (*Brown Sodosol*). With 0-10% texture contrast soil over weathered rock – loamy stony to slightly stony topsoil over sodic clay on weathering rock **D7**-**K4** (*Brown Sodosol-Chromosol*). **FUK** – low-lying plain with <10% saline seepage (slopes 0-1%, 1e, 3-2°s) **FUO** – depression with <10% saline seepage (slopes 0-1%, 1e, 3-2°s) Summary: the main issues are reduced fertility where ironstone gravel occurs due to phosphorous fixation, wetness/waterlogging, some saline seepage, and the relatively impermeable sodic subsoils.
FLB FLZ	1.5 6.1	Mostly arable plateau/summit surfaces and slopes: with ironstone soils and some shallow soils over ferricrete (sheet or boulder laterite). Main soils: ironstone soil – loamy to sandy soil with ironstone gravel over sodic clay **J2**-**J1** (*Ferric Brown Sodosol-Chromosol*). With 10-30% sandy ironstone soil – thick to very thick sandy topsoil with ironstone gravel over sodic clay **J2a**-**J1a** (*sandy Ferric Brown Sodosol*). With 10-30% loamy shallow soil on ferricrete **J3** (*Petroferric Tenosol-Sodosol*). With 0-10% texture contrast soil over weathered rock – loamy stony to slightly stony soil over sodic clay on weathering rock **K4**-**D7** (*Brown Sodosol-Chromosol*). **FLB** – slopes (1.5-3.5%, 2e) **FLZ** – plateau/summit surfaces (slopes 0-2%, 1-2e) Summary: the main issues are reduced fertility with ironstone gravel due to phosphorous fixation, also relatively low fertility topsoils when these are sandy, acidic topsoils and some acidic subsoils, and relatively impermeable subsoils; also shallow soils have low waterholding capacity and some stoniness (ferricrete fragments).
FKB FKK FKZ	1.5 1.1 1.3	Mostly arable plateau/summit surfaces and slopes: with ironstone soils, some soils over weathering rock, and some shallow soils over ferricrete (sheet or boulder laterite). Main soils: ironstone soil – loamy soil with ironstone gravel over sodic clay **J2**-**J1** (*Ferric Brown Sodosol-Chromosol*). With 10-40% texture contrast soil over weathered rock – loamy stony to slightly stony topsoil over sodic clay on weathering rock **K4**-**D7** (*Brown Sodosol-Chromosol*) and

		loamy <u>shallow soil on ferricrete</u> **J3** (*Petroferric Tenosol-Sodosol*). **FKB** – slopes (2-4%, 2e) **FKK** – plains with <10% saline seepage (slopes 0-2%, 1-2e, 2s) **FKZ** – plateau/summit surfaces (slopes 0-2%, 1-2e) Summary: the main issues are reduced fertility where ironstone gravel occurs due to phosphorous fixation, some waterlogging, acidic topsoils and some acidic subsoils, relatively impermeable subsoils, and some stoniness; also shallow soils have low waterholding capacity and some stoniness (ferricrete fragments).
FHA FHB FHK FHL FHM FHO FHZ	1.6 0.6 1.3 0.1 0.1 0.7 6.3	Mostly arable plateau/summit surfaces and mid-level to low-lying plains and slopes: with ironstone soils. Main soils: <u>ironstone soil</u> – loamy soil with ironstone gravel over sodic clay **J2**-**J1** (*Ferric Brown Sodosol-Chromosol*). With 0-10% <u>texture contrast soil over weathered rock</u> – loamy stony to slightly stony topsoil over sodic clay on weathering rock **K4**-**D7** (*Brown Sodosol-Chromosol*). With 0-10% loamy <u>shallow soil on ferricrete</u> **J3** (*Petroferric Tenosol-Sodosol*). **FHA** – mid-level plains (0-2%, 1-2e) **FHB** – slopes (1.5-3.5%, 2e) **FHK** – mid-level plains with <10% saline seepage (slopes 0-1.5%, 1-2e, 2-3s) **FHL** – slopes with <10% saline seepage (slopes 1-2.5%, 2-1e, 2-3s) **FHM** – drainage area slope and lower slopes with <10% saline seepage (slopes 3-5%, 3-2e, 2-3s) **FHO** – low-lying plains with <10% saline seepage (slopes 0-1%, 1e, 2-3s) **FHZ** – plateau/summit surfaces (slopes 0-1.5%, 1e) Summary: the main issues are reduced fertility with ironstone gravel due to phosphorous fixation, some waterlogging, acidic topsoils and some acidic subsoils, relatively impermeable subsoils, and some raised subsoil salinity levels.
FJA FJB FJC FJE FJK FJL FJLw FJM FJQ FJZ	5.5 1.2 1.1 0.2 4.3 15.0 0.1 19.6 0.6 3.3	Mostly arable slopes, summit/plateau surfaces and depressions: with ironstone soils and some soils over weathering rock. Main soils: <u>ironstone soil</u> – loamy soil with ironstone gravel over sodic clay **J2**-**J1** (*Ferric Brown Sodosol-Chromosol*). With 10-40% <u>texture contrast soil over weathered rock</u> – loamy stony to slightly stony topsoil over sodic clay on weathering rock **K4**-**D7** (*Brown Sodosol-Chromosol*). With 0-10% loamy <u>shallow soil on ferricrete</u> **J3** (*Petroferric Tenosol-Sodosol*). **FJA** – mid-level plains (slopes 0-1.5%, 1e) **FJB** – slopes (1-4%, 2e) **FJC** – slopes (3-8%, 3e) **FJE** – flat/depression at head of creek (slopes 0-1%, 1e) **FJK** – summit/plateau surfaces and mid-level plains with <10% saline seepage (slopes 0-2%, 1-2e, 2-3s) **FJL** – slopes with <10% saline seepage (slopes 1-4%, 2e, 2s) **FJLw** – relatively poorly drained slope with <10% saline seepage (slopes 1.5-3.5%, 2e, 2-1s) **FJM** – slopes with <10% saline seepage (slopes 3-15%, 3e, 2-3s) **FJQ** – slopes with marginal salinity (slopes1-4%, 2-3e, 4-3s): with sandy surface soils? **FJZ** – plateau/summit surfaces (slopes 0-2%, 1-2e) Summary: the main issues are reduced fertility where ironstone gravel occurs due to phosphorous fixation, some waterlogging, some stoniness, acidic topsoils and some acidic subsoils, and relatively impermeable subsoils.

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:

J2-J1 Ironstone soil (*Ferric Brown Sodosol-Chromosol*)
Thick to medium thickness light sandy loam to loam (with a few sandy), with a sub-surface layer of clayey sand to sandy loam which is often bleached and includes ironstone gravel; over yellow-brown, olive-brown or olive clay which is often or usually sodic and usually has red and olive mottles. Occasionally there is fine carbonate in the lower subsoil. The unbleached versions of this soil equate to Northcote's 'Seddon Gravelly Soil'. Found on summit/plateau surfaces, crests and slopes.

K4-D7 Texture contrast soil over weathered rock (*Brown Sodosol-Chromosol*)
Thin to thick light sandy loam to sandy loam, with a sub-surface layer of loamy sand to sandy loam which is often bleached and usually includes some meta-sandstone fragments and sometimes includes ironstone fragments or nodules; over usually sodic olive-brown, yellow-brown or olive clay with mottles and often includes hard or weathered rock fragments; overlying weathering meta-sandstone. Often there is fine carbonate in the lower subsoil. Found on slopes, especially lower slopes.

Minor Soils:

G3-F1 Sodic texture contrast soil (*Brown-Grey Sodosol*)
Medium thickness to very thick loamy sand, light sandy loam or loam, with a sub-surface layer of sand to light sandy loam which is often bleached and occasionally includes ironstone nodules or ironstone gravel; over olive-brown, olive or yellow-brown sodic and mottled clay. Sometimes there is fine carbonate in the lower subsoil. Found in drainage depressions and on lower slopes.

J3 Shallow soil on ferricrete (*Petroferric Tenosol-Sodosol*)
Medium thickness to thick loamy sand to light loam, with a bleached sub-surface layer of sand to sandy loam usually with ironstone gravel; overlying nodular ferricrete (sheet or boulder laterite) which is around 10cm thick. Below the ferricrete can be more ironstone gravel; and then an olive to olive-brown sodic and mottled clayey substrate. Found on summit/plateau surfaces and slopes.

J2a-J1a A variant of the ironstone soils has thick sandy topsoil: sandy ironstone soil (*sandy Ferric Brown Sodosol*)
Very thick to thick loamy sand to light sandy loam, with a bleached sub-surface layer of loamy sand with ironstone gravel; over sodic clay with olive and red mottles. Found on summit/plateau surfaces and slopes.

Further information: DEWNR Soil and Land Program