TBC Timber Creek Land System

A dissected plateau cut by steep sided and deep creek gullies. The land system is bordered to the north-east by a less severely dissected plateau area; to the north-west by a sluggishly drained plateau area; to the west by a sluggishly drained plateau area with significant areas of ferricrete (sheet and boulder laterite); to the south by a lower-level plateau area with salinized drainage lines; and to the east by a lower-level plateau area with lagoons and salinized drainage lines. This system is named after Timber Creek, the deep gully of which cuts through the northern part of this land system from west to east. This system is also cut by the deep gullies of Little Timber Creek and the Eleanor River.

Area: 137 km^2

Annual rainfall: 600 - 650 mm average

Geology: The whole area is underlain by early Cambrian age Kanmantoo Group rock, mostly meta-sandstones. These rocks have surface to near surface expression in many areas - mostly on gully slopes. This Kanmantoo Group rock consists of Tapanappa Formation meta-sandstone; undifferentiated Kanmantoo Group meta-sandstones; a few areas of Tunkalilla Formation phyllites and siltstones; and a small area of Balquhidder Formation meta-sandstones. On the plateau surfaces these rocks are overlain by Pliocene age regolith, consisting of deeply weathered clay capped with ironstone gravel. On many slopes, Pliocene-Quaternary age colluvium overlies these rocks, also consisting of deeply weathered clay and usually capped with ironstone gravel. The deeply weathered clay is derived from the underlying Cambrian rock. Areas of Quaternary age alluvial deposits occur in creek flats and lagoonal depressions.

Topography: This land system is a dissected plateau area. The deep gullies of Timber Creek, Little Timber Creek and the Eleanor River dissect this area. There are also other smaller drainage lines. This plateau area has slopes on its southern and eastern edges which run down to lower-level plateau areas. A few lagoonal depression areas occur. The plateau surface areas are gently undulating plains to undulating rises. Many sloping areas form undulating rises; and the deep gully slopes form rolling to undulating low hills. Plateau surface slopes are generally from 0 - 3%, while other areas have slopes from 3% to over 20%. (The steepest slopes are in the deep gullies which are from 30 m to 50 m deep.)

Elevation: From 180 m on the higher parts of the plateau in the very west of the system to less than 50 m in the valley flats of Timber Creek and Little Timber Creek at the eastern end of the system. There is a general tilt of the plateau from its higher areas in the north-west of this system to its lower areas in the south-east.

Relief: From 10 m, to over 60 m in the deepest gullies

Main Soils:

J2	Ironstone soil
K4a-**K2a**	Stony texture contrast soil
K4b-**K2b**	Texture contrast soil on weathered rock

Minor Soils:

J3	Shallow soil on ferricrete
F1-**F2**	Sodic texture contrast soil
M1	Deep loam
I1-**I2**	Deep sand
L1	Shallow rocky soil

Main Features: Arable plateau surfaces and slopes, and non-arable creek gullies and drainage lines. Topsoils are mostly loamy. The main soils are loamy with ironstone gravel over clay. Areas of stony and rocky soils occur mostly on the steeper slopes. Ironstone gravel reduces fertility due to its ability to 'fix' phosphorus. The clayey subsoils (which are sometimes sodic) are relatively impermeable, and result in waterlogged conditions in many soils over winter and spring. Acidic conditions regularly occur in topsoils and subsoils. Patches of saline seepage occur, especially in drainage lines and on lower slopes. A few isolated patches have soils with fine carbonate in the lower subsoil, especially in drainage lines and on lower slopes.

Soil Landscape Units summary: Timber Creek Land System (TBC)

SLU	% of area	Main features #
OZK	0.3	Semi-arable sand spreads. Main soil: bleached deep sand **I1** (*Podosol*). **OZK** – sand spread (slopes 0-3%) Summary: these areas are infertile, have relatively high risk of wind erosion, strong water repellence, and relatively low waterholding capacity due to their deep and bleached sandy soils.
ZB-	0.1	Non-arable saline gully with soils formed on weathered rock. Main soils: stony texture contrast soil to slightly stony texture contrast soil on weathered rock, with sodic clay subsoil: **K4a**-**K2a** and **K4b**-**K2b** (*stony Sodosol* and *Brown Sodosol*). **ZB-** – saline eroded gully with 10-50% of land affected by scalding (slopes 6-10%, 3-4e, 7-5s, 5z). Summary: non-arable sloping and salinized land.
ZO- ZQ- ZR-	0.1 0.6 0.03	Non-arable lagoonal depressions and related features. Main soils: sodic texture contrast soil **F1**-**F2** (*Brown Sodosol*). On lunettes: bleached deep sand **I1**-**I2** (*Podosol*). **ZO-** – marginally saline/waterlogged depression (4s, 5w). Sometimes an isolated depression on plateau surface; sometimes a depression at the head of a creek. **ZQ-** – marginally saline to saline lagoon (4-5s) with melaleuca: often/sometimes submerged. Sometimes including low sandy lunettes (1-2m) **ZR-** – saline lagoon (7s) with samphire and bare areas: often/sometimes submerged. Summary: non-arable due to wetness, seasonal inundation, and/or salinity.
AOm AOmr	9.1 5.8	Non-arable creek gullies: with soils formed on weathered rock or hard rock. Main soils: stony texture contrast soil and texture contrast soil on weathered rock - loamy stony to slightly stony topsoil over clay on weathering rock and rock, mostly meta-sandstone: **K4a**-**K2a** and **K4b**-**K2b** (*stony Chromosol-Dermosol-Sodosol* and *Brown Chromosol-Dermosol-Sodosol*). With 10-30% shallow rocky soil **L1** (*rocky Tenosol-Rudosol*). With approximately 10% sodic texture contrast soil – loamy to sandy soil over sodic clay **F2**-**F1** (*Brown Sodosol*) and deep loam in drainage depression flats **M1** (*loamy Tenosol*). **AOm** – creek gullies with <10% saline seepage (relief<30m, slopes 13-20%, 4-5e, 7g*, 2^{+}s-2^{o}s). **AOmr** – creek gully with <10% saline seepage (relief >30m, slopes 13-30%, 5-4e, 7g*, 2^{+}s-2^{o}s). Summary: non-arable due to the steepness of slopes, and the shallow stony/rocky nature of most soils.
APm	2.7	Non-arable creek gullies and creek beds: with soils formed on weathered rock; and some deeper soils in creek flats. Main soils: stony texture contrast soil and texture contrast soil on weathered rock - loamy stony to slightly stony soil over clay on weathering rock and hard rock, mostly meta-sandstone: **K4a**-**K2a** and **K4b**-**K2b** (*stony Chromosol-Dermosol-Sodosol* and *Brown Chromosol-Dermosol-Sodosol*). With 10-20% sodic texture contrast soil - loamy to sandy soil over sodic clay **F2**-**F1** (*Brown Sodosol*) and 5-10% deep loam in drainage depression flats **M1** (*loamy Tenosol*).

		APm – creek gullies with <10% saline seepage (relief <30m, slopes 3-20%, 3-4e, 7g*, 2^{+}s-2^{o}s). Summary: non-arable due to the steepness of slopes, and the shallow stony nature of most soils.
CAB CAC CAZ	- 0.3 0.3	Semi-arable summit surfaces and slopes: with soils formed on weathered rock. Main soils: stony texture contrast soil with texture contrast soil on weathered rock - stony with slightly stony loamy soil over clay on weathering rock, mostly meta-sandstone: **K4a**-**K2a** with **K4b**-**K2b** (*stony Chromosol-Dermosol-Sodosol* with *Brown Chromosol-Dermosol-Sodosol*). With 10-20% shallow rocky soil over weathering rock **L1** (*rocky Tenosol-Rudosol*). **CAB** – sloping summit surface (slopes 1.5-3.5%, 2e). **CAC** – slopes (3-8%, 3e) **CAZ** – summit surface (slopes 0-2%, 1-2e) Summary: the main issues are stoniness and related reduced waterholding capacity, acidic soil conditions, relatively impermeable subsoils, and some water erosion risk on sloping land.
CBB CBC CBD CBL CBM CBN CBS CBQz CBZ	0.9 1.2 0.8 0.1 6.9 4.2 0.2 0.1 0.7	Arable to semi-arable slopes and summit surfaces: with soils formed on weathered rock; and some deeper ironstone soils. Main soils: stony texture contrast soil and texture contrast soil on weathered rock - stony and slightly stony loamy soil over clay on weathering rock, mostly meta-sandstone: **K4a**-**K2a** and **K4b**-**K2b** (*stony Chromosol-Dermosol-Sodosol* and *Brown Chromosol-Dermosol-Sodosol*). With 10-40% loamy ironstone soil **J2** (*Ferric Brown Chromosol-Dermosol-Sodosol*). With 0-10% shallow soil on ferricrete **J3** (*Petroferric Tenosol*). With 0-10% shallow rocky soil over weathering rock or hard rock **L1** (*rocky Tenosol-Rudosol*). **CBB** – sloping summit surface and slopes (slopes 1.5-3.5%, 2e) **CBC** – slopes (5-10%, 3e) **CBD** – slopes (8-20%, 4-3e) **CBL** – slopes with <10% saline seepage (slopes 1.5-3.5%, 2e, 2s) **CBM** – slopes with <10% saline seepage (slopes 5-10%, 3e, 2s) **CBN** – slopes with <10% saline seepage (slopes 8-20%, 4-3e, 2-1s) **CBS** – slopes with 30% saline seepage (slopes 10-13%, 4-3e, 4-3*s) **CBQz** – slopes with marginal salinity and 5-10% scalding (slopes 1.5-3.5%, 2e, 4s, 4z) **CBZ** – summit surfaces (slopes 0-1.5%, 1-2e) Summary: the main issues are acidic soil conditions, water erosion risk on sloping land, some stoniness, some waterlogging, relatively impermeable subsoils, reduced fertility in areas with ironstone gravel due to phosphorous fixation, and some areas with raised subsoil salinity levels or saline seepage at the surface.
CCO CCT	4.1 2.3	Mostly non-arable lower slopes and drainage depression flats: with soils formed on weathered rock; and some deeper soils over sodic clay in flats. Main soils: texture contrast soil on weathered rock with stony texture contrast soil - slightly stony with stony loamy soil over clay on weathering rock, mostly meta-sandstone: **K4a**-**K2a** with **K4b**-**K2b** (*Brown Chromosol-Dermosol-Sodosol* with *stony Chromosol-Dermosol-Sodosol*). With 10-40% sodic texture contrast soil - loamy to sandy soil over sodic clay **F1**-**F2** (*Sodosol*). **CCO** – lower slopes and drainage depression flats with <10% saline seepage (3^{+}s). **CCT** – lower slopes and drainage depression flats with 10-50% saline seepage (4-3*s). Summary: these areas are mostly non-arable due to wetness and the risk of flooding; some saline seepage also occurs.
CHM	0.5	Mostly arable slopes: with grey powdery gradational soils and some duplex soils, formed on weathered rock. Main soils: slightly stony and stony (mostly quartz fragments) grey powdery loamy topsoil which grades into clay or light clay and overlies weathering rock **K1** (Brown Dermosol-Kandosol). With 10-30% texture contrast soil on weathered rock and stony texture contrast soil - slightly stony to stony (mostly quartz fragments) often grey powdery topsoil over clay overlying weathering rock: **K4b**-**K2b** and **K4a**-**K2a** (*Brown Chromosol-Sodosol* and *stony Chromosol-Sodosol*). With approximately 10% loamy ironstone soil **J2** (*Ferric Brown Chromosol-Dermosol-Sodosol*). **CHM** – slopes (2-6%, 3-2e). Summary: the main issues are acidic topsoil and acidic to strongly acidic subsoil conditions, water erosion risk, some stoniness, and some wind erosion risk due to the powdery nature of many of these soils.

FWB FWC FWL FWM FWZ	2.8 1.3 1.8 1.6 18.8	Mostly arable slopes and plateau/summit surfaces: with loamy ironstone soils; and some shallow soils on ferricrete and soil formed on weathered rock. Main soils: loamy ironstone soil **J2** (*Ferric Brown Chromosol-Dermosol-Sodosol*). With 10-40% texture contrast soil on weathered rock and stony texture contrast soil - slightly stony to stony loamy soil over clay on weathering rock, mostly meta-sandstone: **K4b**-**K2b** and **K4a**-**K2a** (*Brown Chromosol-Dermosol-Sodosol* and *stony Chromosol-Dermosol-Sodosol*) and shallow soil on ferricrete **J3** (*Petroferric Tenosol*). **FWB** – slopes (1-4%, 2e) **FWC** – slopes (1.5-5%, 3-2e) **FWL** – slopes with <10% saline seepage (slopes 1.5-4%, 2e, 2-1s) **FWM** – slopes with <10% saline seepage (slopes 4-8%, 3e, 2-1s) **FWZ** – summit/plateau surfaces (slopes 0-2%, 1-2e) Summary: the main issues are acidic soils, reduced fertility where ironstone gravel occurs due to phosphorous fixation, some water erosion risk on sloping land, relatively impermeable subsoils, some waterlogging, and some stoniness.
FRB FRC FRE FRZ	0.7 0.7 1.2 0.6	Mostly arable slopes, plateau/summit surfaces and depressions: with loamy ironstone soils. Main soils: loamy ironstone soil **J2** (*Ferric Chromosol-Dermosol-Sodosol*). With 0-10% shallow soil on ferricrete **J3** (*Petroferric Tenosol*). With 0-10% texture contrast soil on weathered rock and stony texture contrast soil - slightly stony to stony loamy soil over clay on weathering rock, mostly meta-sandstone: **K4b**-**K2b** and **K4a**-**K2a** (*Brown Chromosol-Dermosol-Sodosol* and *stony Chromosol-Dermosol-Sodosol*). **FRB** – slopes (1-3%, 2-1e) **FRC** – slopes (2-5%, 3-2e) **FRE** – depressions or low-lying plains (slopes 0-2%, 1-2e) **FRZ** – summit/plateau surfaces (slopes 0-2%, 1-2e) Summary: the main issues are acidic soils, reduced fertility with ironstone gravel due to phosphorous fixation, some water erosion risk on sloping land, relatively impermeable subsoils, and some waterlogging.
FPB FPE	0.3 0.1	Mostly arable slopes and depressions: with loamy to sandy ironstone soils. Main soils: loamy to sandy ironstone soil **J2** (*Ferric Chromosol-Dermosol-Sodosol*). **FPB** – slopes (1-3%, 2-1e) **FPE** – depression (slopes 0-1%, 1e) Summary: the main issues are acidic soils, reduced fertility with ironstone gravel due to phosphorous fixation, relatively impermeable subsoils, some waterlogging, and a moderately low wind erosion risk.
FVB FVC FVK FVL FVM FVR FVZ	2.4 4.5 0.1 0.8 12.0 0.05 0.4	Mostly arable slopes and plateau/summit surfaces: with loamy ironstone soils; and some soils formed on weathered rock. Main soils: loamy ironstone soil **J2** (*Ferric Brown Chromosol-Dermosol-Sodosol*). With 10-30% texture contrast soil on weathered rock with stony texture contrast soil - slightly stony with stony loamy soil over clay on weathering rock, mostly meta-sandstone: **K4b**-**K2b** and **K4a**-**K2a** (*Brown Chromosol-Dermosol-Sodosol* with *stony Chromosol-Dermosol-Sodosol*). With 0-10% shallow soil on ferricrete **J3** (*Petroferric Tenosol*). **FVB** – slopes (1-4%, 2e) **FVC** – slopes (4-10%, 3e) **FVK** – mid-level plain with <10% saline seepage (slopes 0-1.5%, 1e, 2s) **FVL** – slopes with <10% saline seepage (slopes 2-4%, 2-3e, 2-1s) **FVM** – slopes with <10% saline seepage (slopes 3-10%, 3e, 2-1s) **FVR** – slopes with 10-50% saline seepage (slopes 4-8%, 3e, 4s) **FVZ** – summit/plateau surfaces (slopes 0-1.5%, 1e) Summary: the main issues are acidic soils, reduced fertility where ironstone gravel occurs due to phosphorous fixation, some water erosion risk on sloping land, relatively impermeable subsoils, some waterlogging, a few areas with raised subsoil salinity levels or saline seepage at the surface, and some stoniness.

FXB FXE FXL FXMz FXZ	2.7 0.4 1.8 0.1 5.0	Mostly arable slopes, plateau/summit surfaces and depressions: with loamy ironstone soils; and some shallow soils on ferricrete. Main soils: loamy ironstone soil **J2** (*Ferric Brown Chromosol-Dermosol-Sodosol*). With 10-40% shallow soil on ferricrete **J3** (*Petroferric Tenosol*). With 0-10% texture contrast soil on weathered rock and stony texture contrast soil - slightly stony to stony loamy soil over clay on weathering rock, mostly meta-sandstone: **K4b**-**K2b** and **K4a**-**K2a** (*Brown Chromosol-Dermosol-Sodosol* and *stony Chromosol-Dermosol-Sodosol*). **FXB** – slopes (2-4%, 2-3e) **FXE** – depression or low-lying plain (slopes 0-1%, 1e) **FXL** – slopes (2-4%, 2e, 2s) **FXMz** – slopes with <10% saline seepage and 10-50% scalding (slopes 4-8%, 3e, 2s, 5z). Actually a borrow-pit area where ironstone gravel has been removed for road building. **FXZ** – summit/plateau surfaces (slopes 0-2%, 1-2e) Summary: the main issues are acidic soils, reduced fertility with ironstone gravel due to phosphorous fixation, some waterlogging, and relatively impermeable subsoils; while the areas with shallow soils are affected by low waterholding capacity and stoniness (ferricrete fragments).
FxB FxZ	0.2 0.1	Mostly arable slopes and plateau/summit surfaces: with shallow soils over ferricrete; and some ironstone soils. Main soils: shallow soil on ferricrete **J3** (*Petroferric Tenosol*). With 10-40% loamy ironstone soil **J2** (*Ferric Brown Chromosol-Dermosol-Sodosol*). With 0-10% texture contrast soil on weathered rock with stony texture contrast soil - slightly stony with stony soil over clay on weathering rock: **K4b**-**K2b** and **K4a**-**K2a** (*Brown Chromosol-Dermosol-Sodosol* with *stony Chromosol-Dermosol-Sodosol*). **FxB** – slopes (1.5-3%, 2e) **FxZ** – summit/plateau surfaces (slopes 0-1.5%, 1e) Summary: the main issues are low waterholding capacity, stoniness (ferricrete fragments), waterlogging, and reduced fertility with ironstone gravel due to phosphorous fixation.

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 Ironstone soil (*Ferric Brown Chromosol-Dermosol-Sodosol*)

Thick, with some medium thickness, loam to light sandy loam, with a sub-surface layer of yellow-brown clayey sand to clay loam (some clayey sand and sandy loam sub-surface layers are bleached) which includes ironstone gravel; over or grading into yellow-brown or olive-brown, or occasionally olive clay, which is sometimes sodic, and usually has red and sometimes olive mottles. The subsoil clay usually breaks down into medium structured 2 - 5 mm lenticular or polyhedral peds, and sometimes has a sub-angular blocky or prismatic primary structure (particularly when the soil has a bleached sub-surface layer). The subsoil clay usually textures as a 'short clay', that is, it only ribbons as for a clay loam but is obviously more clayey than that. This unbleached soil corresponds to the 'Seddon Gravelly Soil' described by Northcote. Found on crests, slopes, flats, depressions and in some drainage depressions (bleached version). (The bleached version is either a Bleached-Ferric Brown Chromosol or a Ferric Brown Sodosol.)

K4a-K2a Stony texture contrast soil (*stony Brown-Grey-Red Chromosol-Dermosol-Sodosol*)
Shallow to moderate depth soil. Medium thickness to thick sandy loam or loam (with some sandy clay loam), with a sub-surface layer of clayey sand to clay loam which is often bleached; over or grading into yellow-brown, olive-brown, brown or even red or olive coloured light clay or clay with mottles. The subsoil clay is sometimes sodic; and overlies weathering meta-sandstone. Meta-sandstone fragments, often ferruginized, and/or quartz fragments occur in the topsoil layers. Quartz fragments can sometimes occur throughout the profile. Sometimes there are ironstone gravel or ironstone nodules in the topsoil layers. Occasionally there is fine carbonate in the lower subsoil. Found on slopes and crests, especially the steeper slopes of creek gullies.

K4b-K2b Texture contrast soil on weathered rock (*Brown Chromosol-Dermosol-Sodosol*)
Thick, with some medium thickness, light sandy loam, sandy loam, loam or light clay loam, with a sub-surface layer of sandy loam to clay loam which is sometimes bleached; grading into or overlying clay or light clay which is often sodic. This layer then grades into weathering rock at moderate or greater depth. The subsoil clay usually breaks down into 2 - 5 mm lenticular or polyhedral secondary structure. Sometimes ironstone nodules are present in the topsoil layers and occasionally they are present throughout the profile. Sometimes minor quartz and/or meta-sandstone fragments are present in some layers. Found on slopes, often lower slopes, and in some drainage depressions.

Minor Soils:

J3 Shallow soil on ferricrete (*Petroferric Tenosol*)
Shallow soil overlying ferricrete (sheet or boulder laterite). Thin loamy topsoil; over a layer of sandy loam, the lower half or sometimes all of which is bleached, and including very abundant ironstone gravel; overlying a layer of cemented nodular ironstone (ferricrete). The small amount of soil matrix material contained within the ferricrete layer has a sandy clay loam texture. The ferricrete is underlain by mottled and usually sodic clayey substrate material. Found on slopes and crests (remnant plateau surfaces).

F1-F1 Sodic texture contrast soil (*Brown Sodosol*)
Thick, with some medium thickness, loamy to sandy soil, with a bleached sub-surface layer of clayey sand; over yellow-brown to olive-brown usually sodic clay with mottles. Occasionally with fine carbonate in the lower subsoil. Found on drainage depression flats, on some lower slopes and in lagoonal depressions.

M1 Deep loam (*loamy Tenosol*)
Deep sandy loam to loam. This soil overlies sandy clay, loamy or clay loamy substrate material. A depositional soil found on some lower slopes and in drainage depression flats.

I1-I2 Deep sand (*Podosol*)
Deep soil. Sand to light sandy loam, with a bleached sub-surface layer of sandy soil; overlying sandy subsoil with accumulations of organic/iron rich material. Sometimes there are some organic/iron rich 'coffee rock' segregations or layer in the subsoil. Usually underlain by a clayey substrate at depth. There is often an ironstone gravelly layer directly overlying the clayey substrate. Found on slopes, in depressions, and on some drainage depression flats.

L1 Shallow rocky soil (*rocky Tenosol-Rudosol*)
Shallow to very shallow soil. Sandy loam with meta-sandstone fragments and often with ironstone gravel or ironstone nodules; overlying weathered or hard meta-sandstone rock. Found on gully slopes and in creek beds.

Further information: DEWNR Soil and Land Program