TND Townsend Land System

Area: 109 km^2

Landscape: Swampy corridor plains and elongate low calcarenite ridges near Reedy Creek

Annual rainfall: 600 - 700 mm average

Geology: Mostly Pleistocene Padthaway Formation calcareous lacustrine clays, with occasional Pleistocene Bridgewater Formation calcreted calcarenite stranded beach ridge deposits. Holocene lacustrine sediments have accumulated in places where impounded drainage occurs on the landward side of the ridges.

Main soils:
B5 (29%) Shallow dark clay loam on limestone (Petrocalcic Black-Grey Dermosol)
N3 (14%) Wet soil (non to moderately saline) (Sodosolic-Calcarosolic-Dermosolic Hydrosol)
B2 (12%) Shallow calcareous loam on calcrete (Petrocalcic Calcarosol-Rudosol)
B3 (10%) Shallow sandy loam on calcrete (Petrocalcic Red Tenosol-Kandosol-Rudosol)

Minor soils:
B7 (6%) Shallow sand over clay on calcrete (sandy Petrocalcic Sodosol-Chromosol)
N1 (6%) Peat (Organosol)
B6 (5%) Shallow loam over red-brown clay on calcrete (Petrocalcic Red Chromosol-Kandosol)

Summary: Soils are predominantly shallow dark clay loams on calcrete. Waterlogging and flooding are common land use constraints on the plains. Salinity occurs in some swamps and plains, but is not usually high. On rises, the shallow soils are well drained, but have limited waterholding capacity.

Soil Landscape Unit summary: Townsend Land System (TND)

SLU	% of area	Component	Main soils	Prop#	Notes
MAB	1.9	Rise	B3RR	D	**MAB** Gently undulating calcreted former beach ridges with stony, very shallow red and brown loam, occasionally over red clay, on calcrete. >50% bare calcrete. **MAC** as above, undulating slopes. Main soils: Rock or exposed calcrete – **RR** and Shallow sandy loam on calcrete - **B3**.
MAC	0.1	Rise	B3RR	D	
M-C	2.7	Rise	RRB3	D	Undulating rises, as above but <50% bare calcrete. Main soils: Shallow sandy loam on calcrete - **B3** and Rock or exposed calcrete – **RR**.
McB	1.5	Undulating plain	G3H3	D	Gently undulating plains with deep sand over brown clay, or deep, bleached, acidic, siliceous sand; 10-30% deep acidic, leached sand or shallow sandy loam over poorly structured clay on calcrete, or shallow bleached sand on calcrete. Main soils: Thick sand over clay - **G3**; Bleached siliceous sand - **H3**.
MEB	1.1	Stony rise	B3B8	D	Gently undulating stony rises with shallow sandy loam on calcrete, or shallow bleached siliceous sand on calcrete; 10-30% sandy loam over red clay on calcrete, or deep bleached acidic sand. Main soils: Shallow sandy loam on calcrete - **B3** and Shallow sand on calcrete - **B8**.

MHB	0.5	Dune	H3	E	Gently sloping calcarenite ridges with deep bleached siliceous sands on dunes, often over brown sandy clay. Co-dominant are shallow stony range rises with shallow siliceous sand on calcrete or bare rock, or occasionally, sandy loam on red clay on calcrete. Main soils: ***Dunes:*** Bleached siliceous sand - **H3**. ***Stony ranges:*** Shallow sandy loam on calcrete - **B3** and Rock or exposed calcrete – **RR**.
		Stony range	B3RR	E	
MLF	1.6	Steep range	B3RR H3	D	"Range" of steep hills and rises with shallow loamy sand over thin red clay, bare calcrete, and deep bleached siliceous sand. Main soils: Shallow sandy loam on calcrete - **B3,** Rock or exposed calcrete – **RR** and Bleached siliceous sand - **H3**.
MwB	3.5	Undulating plain	B6B4	D	Undulating plains with texture contrast or, gradational shallow red sandy loam over well structured red clay on calcrete; 10-30% very shallow with thin sandy loam on calcrete, or bare calcrete. Main soils: Shallow sandy loam over red-brown clay on calcrete - **B6** and Shallow red loam on limestone - **B4**.
MWB	2.9	Gently undulating plain	B7B6	D	Gently undulating plains with loamy sand over poorly structured brown clay on calcreted calcarenite, or sandy loam over red clay on calcrete; 10-30% bare calcrete, or very shallow sandy loam on calcrete. Main soils: Sand over friable brown clay on calcrete - **B7** and Shallow sandy loam over red-brown clay on calcrete - **B6**.
NBB	3.5	Stony plain	B5B2	D	**NBB** Stony plains with thin black cracking clay or calcareous clay loam over calcreted marl or calcareous lagoonal clayey sediments. **NBN** Poorly drained plains with shallow dark grey calcareous clay loam over dark clay on calcrete. 10-30% wet depressions containing variously, shallow, non-peaty, wet, dark, grey clay loam or peat. 20-30% rises with shallow loam over very thin red clay on calcrete; 10-30% very shallow calcareous loam on calcrete. **NBT** Swampy stony plains with soils as for **NBB**, 20-30% sandy rises with shallow bleached sand on calcrete, or thin sandy loam often over thin red clay on calcrete. Main soils: ***Swampy stony plains:*** Shallow dark clay loam on limestone - **B5** and Shallow calcareous loam on calcrete - **B2**. ***Sandy rises:*** Shallow sand on calcrete - **B8** and Shallow sandy loam on calcrete - **B3**.
NBN	0.4	Plain	B5	V	
		Rise	B3	C	
NBT	1.7	Swampy stony plain	B5B2	V	
		Sandy rise	B8B3	C	
NKG	22.4	Plain	B5	D	Plains with shallow dark cracking clay over calcrete; 10-30% shallow clay loam over poorly structured brown or yellow-grey clay on calcrete. Main soils: Shallow dark clay loam on limestone - **B5**.
NxF	1.4	Plain	B5B2	V	**NxF** Plains with shallow dark clay loam over dark clay on calcrete, or calcareous clay loam on calcrete; 10-30% bare calcrete, or shallow sand or dark clay loam over poorly structured clay on calcrete. 10-20% swamps with wet dark clay loam over dark clay; 10-30% shallow calcareous clay loam on calcrete. **NxI** Plains as for **NxA** but 10-30% moderately drained, deep sand over organic pan or brown clay, often wet. 10-20% swamps with peat or wet dark clay loam over dark clay; also 10-30% dark clay loam over dark clay, often shallow on calcrete. **NxU** Plains as for **NxA**; 20-30% lunettes with mostly very shallow calcareous loam on calcrete; 10-30% texture contrast, shallow loam over red clay on calcrete. 20-30% swamps with wet deep clay loam over dark clay; 10-30% shallow calcareous clay loam on calcrete.
		Swamp	N3	C	
NxI	8.4	Plain	B5B2	V	
		Swamp	N3N1	L	
NxU	25.1	Plain	B5B2	E	
		Lunette	B3	C	
		Swamp	N3	C	

					Main soils: ***Plains:*** Shallow dark clay loam on limestone - **B5** and Shallow calcareous loam on calcrete - **B2**. ***Swamps:*** Wet clay loam - **N3** and Peaty soil – **N1**. ***Lunettes:*** Shallow sandy loam on calcrete - **B3**.
NYB	0.4	Stony plain	B2B5	D	Stony plains with very shallow, dark grey cracking clay on calcrete. 10-30% bare calcrete. Main soils: Shallow calcareous loam on calcrete - **B2** and Shallow dark clay loam on limestone - **B5**.
Xf-B	1.4	Lunette	B7B5	D	Lunettes of medium height, with shallow sandy loam over poorly structured grey-brown clay on calcrete, or dark clay loam over dark clay on calcrete; 10-30% bare calcrete. Main soils: Sand over friable brown clay on calcrete - **B7** and Shallow dark clay loam on limestone - **B5**.
Xl-	0.1	Lake	WW	D	Water filled lakes or swamps.
XRC	0.9	Swamp	N3	D	Swamps with wet dark, cracking clay soils with minor peats. Main soils: Wet clay loam - **N3**.
XtC	6.3	Swamp	N1	D	**XtC** Peat swamps. **Xtf** Peat swamps; 10-30% wet organic loam grading to dark clay, often wet. 20-30% rises with shallow calcareous loam or sandy loam over thin red-brown clay on calcrete; 10-30% bare calcrete, or shallow loam over dark yellow-grey clay on calcrete. Main soils: ***Swamps:*** Peaty soil – **N1**. ***Stony rises:*** Shallow calcareous loam on calcrete - **B2** and Shallow sandy loam on calcrete - **B3**.
Xtf	1.8	Swamp	N1	V	
		Rise	B2B3	C	
XuC	0.2	Swamp	N3	D	**XuC** Swamps with non-peaty wet sand over dark clay; 10-30% wet peat. **Xud** Swamps with wet, dark organic loam over dark clay, 10-30%deep dark clay loam over dark brown poorly structured clay. 10-20% sandy rises and hummocks, with deep sand often over, poorly structured brown clay or organic pans. **Xue** Swamps with wet, dark clay loam over dark clay, 10-30% water filled. 20-30% rises and hummocks, with deep dark clay loam over, often poorly structured dark clay; occasionally shallow on calcrete. **Xuf** Swamps as above; 20-30% stony rises with shallow often calcareous, grey clay loam, often over dark grey clay, on calcrete. **XuX** Swamps with wet, marginally saline and non-saline, dark clay loam over dark clay, often shallow over calcrete. Main soils: ***Swamps:*** Wet clay loam - **N3**, Wet saline clay loam - **N2c** and Shallow dark clay loam on limestone - **B5**. ***Stony rises:*** Shallow calcareous loam on calcrete - **B2**; Shallow sandy loam on calcrete - **B3;** Shallow calcareous loam on calcrete - **B2**. ***Loamy rises:*** Deep friable gradational clay loam - **M2** and Deep hard gradational sandy loam - **M4**. ***Sandy rises:*** Thick sand over clay - **G3**; Wet highly leached sand - **I2**.
Xud	1.9	Swamp	N3	V	
		Sandy rise	G3I2	L	
Xue	1.9	Swamp	N3	V	
		Rise	M2M4	C	
Xuf	1.4	Swamp	N3	V	
		Stony rise	B2B3	C	
XuX	4.6	Swamp	N2N3 B5	D	
Zpd	0.3	Plain	G4N2	V	Marginally saline plains with thin sand over poorly structured brown clay, often wet. <10% swamps with highly to slightly saline, mostly wet, dark clay loam over clay, often shallow on calcrete. <10% sandy rises with deep sand over brown clay; 10-30% deep bleached sand or bleached sand over red-brown sandy clay. Main soils: ***Plains:*** Sand over yellow and brown clay - **G4** and Wet saline clay loam - **N2c**. ***Swamps:*** Wet saline clay loam - **N2c**, Wet clay loam - **N3** and Shallow dark clay loam on limestone - **B5**. ***Sandy rises:*** Thick sand over clay - **G3**.
		Swamp	N2N3 B5	M	
		Sand rise	G3	M	

PROPORTION codes assigned to Soil Landscape Unit (SLU) components:

D	Dominant in extent (>90% of SLU)	C	Common in extent (20–30% of SLU)
V	Very extensive in extent (60–90% of SLU)	L	Limited in extent (10–20% of SLU)
E	Extensive in extent (30–60% of SLU)	M	Minor in extent (<10% of SLU)

Detailed soil profile descriptions:

B2 Shallow calcareous sandy loam on calcrete (Petrocalcic Calcarosol)
Up to 40 cm calcareous loamy sand to sandy loam with variable calcrete rubble overlying calcreted calcarenite - rises.

B3 Shallow sandy loam on calcrete (Petrocalcic Rudosol)
Medium thickness non-calcareous sandy loam, often having a slight clay increase with depth, over calcreted calcarenite shallower than 50 cm - rises.

B4 Red sandy loam over calcrete (Petrocalcic, Red Dermosol)
Medium thickness red sandy loam grading to friable red clay loam over calcreted calcarenite within 50 cm - rises.

B5 Shallow dark clay loam on limestone (Petrocalcic, Black Dermosol)
Black clay loam to light clay over calcreted limestone at shallow depth, grading to highly calcareous clay - flats.

B6 Shallow sandy loam over red-brown clay on calcrete (Petrocalcic, Red Kandosol)
Medium thickness sandy loam with slight ironstone gravel overlying a weakly structured reddish brown sandy clay on calcarenite within 50 cm - rises.

B7 Shallow sand over sandy clay on calcrete (Petrocalcic, Brown Chromosol)
Medium thickness sand overlying brown friable sandy clay to clay on limestone or calcreted sandy clay within 50 cm - flats.

B8 Shallow sand on calcrete (Petrocalcic, Bleached-Leptic Tenosol)
Thick bleached sand over calcreted calcarenite within 50 cm - rises.

G3 Thick sand over clay (Hypercalcic, Brown Sodosol/ Chromosol)
Thick bleached sand with an organically darkened surface abruptly overlying a massive to coarsely structured brown to reddish yellow sandy clay to clay, calcareous with depth - rises.

G4 Sand over poorly structured clay (Sandy Brown-Red Sodosol-Chromosol)
Topsoil <30 cm over a poorly structured subsoil. Thin sandy texture contrast soil with a sodic /dispersive /poorly structured brown or red clayey subsoil. Can have some ironstone.

H3 Deep bleached sand (Basic, Arenic, Bleached-Orthic Tenosol)
Grey sand over a very thick bleached sand grading to yellow sand continuing below 100 cm.

I2 Wet highly leached sand (Fragic, Humic, Aquic Podosol)
Grey sand with a thick bleached A2 horizon, overlying a thin to thick layer of coffee rock, grading to pale brown sand sharply overlying a grey, brown and yellow mottled sandy clay loam to light clay.

M2 Deep friable gradational clay loam (Red-Brown-Grey- Black Dermosol)
Deep well structured red clay loamy soil.

M4 Deep hard gradational sandy loam (Hard Brown-Dark Kandosol- Dermosol)
Deep dark brown loamy to clay loamy soil grading to clay at depth. Hardsetting surface often with prismatic structures in the subsoil.

N1 Peat (Organosol)
Peaty soil.

N2c Wet saline clay loam (Dermosolic, Salic Hydrosol)
Medium thickness dark grey to black clay loam to clay grading to a well structured dark grey clay with minor carbonates and a water table within 100 cm.

N3 Seasonally waterlogged, non to marginally saline equivalents of soils listed above, viz.:
N3c Wet **G3**
N3d Wet **B5**
N3e Wet **B7**

RR Bare rock

WW Water

Further information: DEWNR Soil and Land Program