ROS Ross Land System

Area: 383.3 km^2

Annual rainfall: 570 – 695 mm average

Geology: Lacustrine deposits of the Pleistocene Padthaway Formation and Late Pleistocene clayey, shelly and calcreted sediments of the Glanville Formation.

Landscape: Stony plains, southeast of Kingston with mainly dark coloured, medium to fine textured soils with scattered swamps and lunettes.

Topography: The Ross Land System is a very gently inclined plain, bordered on both its western and eastern edges by calcarenite ranges. The plain has an imperceptible grade to the west, causing surface waters to pond against the western range. Low north - south calcarenite ridges protrude through the sedimentary cover of the plain, as do minor granite domes.

Elevation: 10 - 20 m

Relief: Less than 10 m

Soils: The characteristic soils are black loams to clay loams over calcreted limestone. These are associated with other shallow less clayey soils on calcrete, gradational loams, sandy texture contrast soils, and a range of wet saline soils which are becoming increasingly extensive as watertables rise.

Main soils:

N2	(23%) Saline soil	(Salic-Hypersalic Hydrosol)
B5	(21%) Shallow dark clay loam on limestone	(Petrocalcic Black-Grey Dermosol)
B2	(19%) Shallow calcareous loam on calcrete	(Petrocalcic Calcarosol-Rudosol)

Minor soils:

N3	(7%) Wet soil (non to moderately saline)	(Sodosolic-Calcarosolic-Dermosolic Hydrosol)
M4	(5%) Deep hard gradational loam	(Hard Brown-Dark Kandosol- Dermosol)
B7	(4%) Shallow sand over clay on calcrete	(sandy Petrocalcic Sodosol-Chromosol)
A7	(4%) Clay loam on marl	(Marly Calcarosol)
G3	(3%) Thick sand over clay	(sandy Brown-Red Chromosol-Sodosol)

Summary: The Ross Land System is a flat plain characterized by shallow black loamy soils over limestone. These soils are inherently fertile, although often shallow. Although these soils naturally have shallow watertables, rising saline groundwater tables are exacerbating the problems of waterlogging and salinity on the flats.

Salinity is a major limitation for land use, which here is accompanied with flooding potential and the shallowness of the soils over calcrete. The land is mostly used for grazing and has been artificially drained to overcome, where possible, the problems mentioned above. Many of the soils are also calcareous which will limit their use for cultivation of lime-sensitive crops, such as lupins.

Soil Landscape Unit summary: 39 Soil Landscape Units (SLUs) mapped in the Ross Land System

SLU	% of area	Component	Main soils	Prop#	Notes
McB	0.1	Undulating plain	G3H3	D	Gently undulating plain with deep sand, mostly over brown clay. 10-30% deep bleached siliceous sand; or shallow loam over poorly structured brown clay on calcrete; or bleached sand on calcrete. Main soils: Thick sand over clay - **G3** and Bleached siliceous sand - **H3**.
MCBA	0.2	Low rise	B6B3H3	D	Gently sloping low dune ranges with shallow sand, mostly over red clay, on calcrete. Deep calcareous siliceous sand is also common on dunes. Lower slopes often have shallow sand over poorly structured brown clay. Main soils: Shallow sandy loam over red-brown clay on calcrete - **B6**, Shallow sandy loam on calcrete - **B3** and Bleached siliceous sand - **H3**.
MJB	0.02	Undulating plain	B2B8	D	Undulating plains with shallow calcareous sandy loam, or bleached siliceous sand, over calcrete. The rises are well drained and not saline, but are small and are surrounded by moderately to highly saline flats. Low calcarenite ridge, less than 10 m high. There is extensive calcrete outcrop and variable surface stone. Main soils: shallow sand on calcrete - **B8** (E) and shallow calcareous loamy sand on calcrete - **B2b** (E). Main soils: Shallow calcareous loam on calcrete - **B2** and Shallow sand on calcrete - **B8**.
NBB	1.0	Stony plain	B5B2	D	**NBB** Stony plain with thin black cracking clay or calcareous clay loam over calcreted marl or calcareous lagoonal clayey sediments, often with freshwater shells. **NBi** Stony plain as above, moderately saline; 20-30% swamps with wet, highly saline, clays as in **NBB**. Main soils: ***Stony plains:*** Shallow dark clay loam on limestone - **B5** and Shallow calcareous loam on calcrete - **B2**. ***Swamps:*** Wet saline clay loam - **N2c**.
NBi	23.9	Stony plain	B5B2	V	
		Swamp	N2	C	
NDV	2.3	Plain	G3B7B5	V	Plains with sandy loam over poorly structured yellow/grey clay; often shallow over calcrete; or shallow calcareous clay loam over dark clay on calcrete. 10-20% stony rises with shallow loam, mostly over red clay, on calcrete; 10-30% bare calcrete. 10-20% sandy rises with deep sand over yellow/brown clay; or sandy loam over poorly structured brown clay on calcrete. Main soils: ***Plains:*** Thick sand over clay - **G3**, Sand over friable brown clay on calcrete - **B7** and Shallow dark clay loam on limestone - **B5**. ***Stony rises:*** Shallow sandy loam over red-brown clay on calcrete - **B6** and Shallow sandy loam on calcrete - **B3**. ***Sandy rises:*** Thick sand over clay - **G3**, Sand over friable brown clay on calcrete - **B7**.
		Stony rise	B6B3	L	
		Sandy rise	G3B7	L	
NjA	2.0	Plain	B7	D	Plains with shallow sand over poorly structured brown clay on calcrete. Main soils: ***Plains:*** Sand over friable brown clay on calcrete - **B7**.

NJa	5.8	Plain	B5B2M4	D	**NJa** Plains with moderately saline dark clay loam, mostly over dark clay, on calcrete. Often deep gradational dark clay loam over clay, soils. 10-30% saline wet soils in swampy areas. **NJA** Plains as above, but better drained and with non-saline dark clay loam, mostly over dark clay, on calcrete. Often deep gradational dark clay loam over clay, soils. Main soils: Shallow dark clay loam on limestone - **B5**, Shallow calcareous loam on calcrete - **B2** and Deep hard gradational sandy loam - **M4**.
NJA	7.3	Plain	B5B2M4	D	
NKf	0.1	Plain	A7N2B2	D	**NKf** Plains with deep calcareous grey gradational loam over clay on marl; often saline; or shallow on calcrete. **NKu** Plains as above; 10-20% swamps with mixed wet, saline and non-saline soils, gradational clay loam over dark brown/grey clay; 10-30% shallow clay loam on grey/yellow clay on calcrete; or deep calcareous gradational clay loam over clay, on marl or calcrete. 10-20% stony rises with shallow dark loam, mostly over dark clay, often poorly structured, on calcrete. Main soils: ***Plains:*** Calcareous clay loam on marl - **A7**, Wet saline clay loam - **N2c** and Shallow calcareous loam on calcrete - **B2**. ***Swamps:*** Wet clay loam - **N3**, Deep hard gradational sandy loam - **M4** and Wet saline clay loam - **N2c**. ***Stony rises:*** Shallow dark clay loam on limestone - **B5**, Sand over friable brown clay on calcrete - **B7** and Shallow loam on calcrete - **B3**.
NKu	5.6	Plain	A7N2B2	V	
		Swamp	N3M4 N2	L	
		Stony rise	B5B7B3	L	
NkP	1.6	Plain	B7G3	V	Plains with shallow, sand over poorly structured brown clay, on calcrete; or deep sand over poorly structured brown clay. 10-20% sand rises with deep acid water repellent siliceous bleached sand; occasionally over brown clay. Main soils: ***Plains:*** Sand over friable brown clay on calcrete - **B7** and Thick sand over clay - **G3**. ***Sandy rises:*** Highly leached sand - **I1** and Bleached siliceous sand - **H3**.
		Sandy rise	I1H3	L	
NnM	2.1	Plain	B5B2	V	Plains with shallow dark grey cracking clay on calcrete; or shallow grey, calcareous clay loam on calcrete. 20-30% stony rises with shallow grey, calcareous clay loam on calcrete. Main soils: ***Plains:*** Shallow dark clay loam on limestone - **B5** and Shallow calcareous loam on calcrete - **B2**. ***Stony rises:*** Shallow calcareous loam on calcrete - **B2**.
		Stony rise	B2	C	
NQF	4.6	Plain	C5E3	V	Plains with deep gradational clay loam or dark cracking clay over dark grey clay, on soft or rubbly carbonate. 30-60% swampy lacustrine plains with mostly wet, non-saline dark clay loam over dark, calcareous clay. <10% lunettes with calcareous loam, mostly shallow on calcrete, but also on marl. Main soils: ***Plains:*** Gradational dark clay loam – **C5** and Brown or grey cracking clay – **E3**. ***Swamps:*** Wet clay loam - **N3**. ***Lunettes:*** Shallow calcareous loam on calcrete - **B2** and Calcareous clay loam on marl - **A7**.
		Swamp/lake plain	N3	E	
		Lunette	B2A7	M	

NTa	2.9	Plain	G3N2	D	Poorly drained plains with deep sandy loam over brown clay, often wet. Main soils: Thick sand over clay - **G3** and Wet saline clay loam - **N2c**.
Nua	0.4	Plain	M4F2 N2	D	Plains with deep dark clay, or clay loam over poorly structured clay, often wet. Main soils: Deep hard gradational sandy loam - **M4**, Sandy loam over poorly structured brown or dark clay - **F2** and Wet saline clay loam - **N2c**.
Nxb	0.4	Stony plain	B2B5M4	D	**Nxb** Stony plains with mostly shallow, often calcareous dark grey clay or clay loam on calcrete; often deep clays with poorly structured dark clay subsoils; 10-30% wet, swampy areas. **Nxi** Plains as above, with mostly shallow, often calcareous dark grey clay or clay loam on calcrete; 10-30% wet, non-saline swampy areas. 30-60% swamps with highly saline, wet dark clay loam soils. **Nxj** Plains as above, with mostly shallow, often calcareous dark grey clay or clay loam on calcrete; 10-30% wet, saline swampy areas. 10-20% swamps with wet, mostly moderately saline deep and shallow dark clay loam over dark clay or calcrete. <10% stony rises with shallow loam, over mostly thin, but occasionally thick red clay on calcreted calcarenite. Main soils: ***Stony plains:*** Shallow calcareous loam on calcrete - **B2**, Shallow dark clay loam on limestone - **B5** and Deep hard gradational sandy loam - **M4**. ***Swamps:*** Peaty soil – **N1**, Wet saline clay loam - **N2c** and Wet clay loam - **N3**.
Nxi	0.2	Plain	B2B5	E	
		Swamp	N2	E	
Nxj	5.2	Plain	B2B5	V	
		Swamp	N3N1	L	
		Stony rise	B3	M	
NYG	1.8	Depression	N3B2 M2	D	Depressions with mostly wet, non-saline, often calcareous clay loam on calcrete or poorly structured dark clay. Main soils: Wet clay loam - **N3**, Shallow calcareous loam on calcrete - **B2** and Deep friable gradational clay loam - **M2**.
OND	0.1	Low dune	H3	D	Low dunes with deep calcareous siliceous sands. 10-30% deep bleached siliceous sand. Main soils: Bleached siliceous sand - **H3**.
Xc-A	0.3	Lunette	B2B3	D	Lunettes with mostly calcareous, loam on calcrete. slightly to moderately saline. Main soils: Shallow calcareous loam on calcrete - **B2** and Shallow sandy loam on calcrete - **B3**.
XQd	0.3	Swamp	N3	E	**XQd** Swamps with wet, slightly to moderately saline, deep dark clay loam over clay; 10-30% water filled or with peat soils. 30-60% sandy rises with deep sand over brown clay, and with wet swales. **XQF** Swamps with wet, moderately saline, deep dark clay loam over clay soils; 10-30% water filled; peat soils or saline wet soils. Main soils: ***Swamps:*** Wet clay loam - **N3**. ***Sandy rises:*** Thick sand over clay - **G3**, Wet clay loam - **N3**.
		Sandy rise	G3N3	E	
XQF	1.8	Swamp	N3	D	

XRD	0.1	Swamp	N3	D	**XRD** Swamps with mostly wet, dark clay over clay soils; 10-30% peat, dark cracking clay or dark clay loam over clay soils. **XRe** As above with 20-30% lunettes or hummocks with clayey calcareous soils on marl and sand over dark clay soils. **XRf** Swamps, with dark, mostly wet, cracking clay soils. 10-20% stony rises with shallow dark grey clay loam, often on dark clay over calcrete, sometimes calcareous throughout. Main soils: ***Swamps:*** Wet clay loam - **N3** and Brown or grey cracking clay – **E3**. ***Lunettes:*** Calcareous clay loam on marl - **A7** and Thick sand over clay - **G3**. ***Stony rises:*** Shallow dark clay loam on limestone - **B5** and Shallow calcareous loam on calcrete - **B2**.
XRe	1.3	Swamp	N3E3	V	
		Lunette	A7G3	C	
XRf	0.7	Swamp	N3	V	
		Stony rise	B5B2	L	
XuX	0.6	Swamp	N2N3B5	D	Swamps with wet, moderately to slightly saline dark clay loam over dark clay; often shallow over calcrete. Main soils: Wet saline clay loam - **N2c**, Wet clay loam - **N3** and Shallow dark clay loam on limestone - **B5**.
ZC-	0.2	Saline flat	N2	D	Saline flat with mostly wet, moderately to highly saline loam, over poorly structured dark brown clay. Main soils: Wet saline clay loam - **N2c**.
ZD-	4.4	Salt lake	N2	D	Salt lake with highly saline clay loam over clay, bare salt encrusted surface common; 10-30% water filled. <10% lunettes with deep grey calcareous clay loam gradational to clay with soft or rubbly carbonate; or often shallow on calcrete. Main soils: ***Salt lakes:*** Wet saline clay loam - **N2c**. ***Lunettes:*** Gradational calcareous clay - **A6** and Shallow calcareous loam on calcrete - **B2**.
		Lunette	A6B2	M	
ZI-	3.1	Salt lake	N2	V	Salt lake with highly saline clay loam over clay, bare salt encrusted surface common; 10-30% water filled. 20-30% lunettes with deep grey calcareous clay loam, mostly shallow on calcrete, but often on marl. Main soils: ***Salt lakes:*** Wet saline clay loam - **N2c**. ***Lunettes:*** Shallow sandy loam on calcrete - **B3** and Calcareous clay loam on marl - **A7**.
		Lunette	B3A7	C	
ZL-	1.0	Lunette	A6B2	D	Lunettes with deep grey calcareous clay loam gradational to clay with soft or rubbly carbonate; or often shallow on calcrete. Main soils: Gradational calcareous clay - **A6** and Shallow calcareous loam on calcrete - **B2**.
ZnJ	0.4	Plain	G4N2	D	Plains with moderately saline, often wet, sandy loam over dark brown, poorly structured clay. Main soils: Sand over poorly structured clay - **G4** and Wet saline clay loam - **N2c**.
Zq-	4.4	Salt flat	N2A7	D	Saline flat with mostly wet saline, calcareous grey clay loam on dark clay, on marl or (10-30%) calcreted marl. Main soils: Wet saline clay loam - **N2c** and Calcareous clay loam on marl - **A7**.

ZS-	0.4	Salt pan	N2A7 WW	D	Saline flat with mostly wet saline, calcareous grey clay loam on dark clay on marl; or water filled. 10-30% non-saline wet soils, or deep clay grading to dark clay. Main soils: Wet saline clay loam - **N2c**, Calcareous clay loam on marl - **A7**.
ZU-	0.04	Lake	WW	D	Water filled lake, moderately saline.
Zx-	5.9	Swampy flat	N2	E	Swampy flat with mostly wet, moderately saline dark clay loam, on dark clay. 10-30% shallow on calcrete; 10-30% are non-saline. 30-60% lunettes with shallow loam over red or poorly structured brown clay on calcrete, occasionally very shallow or deep on calcareous rubbly clay. Main soils: ***Swampy flats:*** Wet saline clay loam - **N2c**. ***Lunettes:*** Shallow sandy loam over red-brown clay on calcrete - **B6**, Shallow clay loam over brown or dark clay on calcrete - **B9**, Sand over friable brown clay on calcrete - **B7**.
		Lunette	B6B9B7	E	
ZX-	7.1	Lagoonal depression	N2	V	Lagoonal depression with wet, highly saline dark clay loam over dark clay; 10-30% slightly saline. Main soils: ***Lagoonal depressions:*** Wet saline clay loam - **N2c**. ***Lunettes:*** Shallow sandy loam on calcrete - **B3** and Calcareous clay loam on marl - **A7**.
		Lunette	B3A7	C	
Zy-	0.6	Swamp	N3N2 M4	V	Swamps with moderately saline, mostly wet, dark cracking clay; 10-30% water filled or calcareous clay on marl. 10-20% lunettes with dark clay loam, often over dark clay, on calcrete. Main soils: ***Swamps:*** Wet clay loam - **N3**, Wet saline clay loam - **N2c** and Deep hard gradational sandy loam - **M4**. ***Lunettes:*** Shallow dark clay loam on limestone - **B5** and Shallow clay loam over brown or dark clay on calcrete - **B9**.
		Lunette	B5B9	L	

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:

A6 Gradational calcareous clay loam (Pedal Hypercalcic-Lithocalcic Calcarosol on clayey subsoil)
Calcareous loams to clay loams grading into brown-red clay. Often rubbly.

A7 Calcareous clay loam on marl (Marly Calcarosol)
Dark calcareous clay with a marly subsoil (often saline in Upper SE). Often with shells and a peaty surface.

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.

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.

B9 Shallow clay loam over brown or dark clay on calcrete (Clay loamy Petrocalcic Sodosol)
Poorly structured, often coarse prismatic, clay loam grading to brown or dark clay on calcrete.

C5 Gradational dark clay loam (Calcic-Hypercalcic Brown-Grey-Black Dermosol-Calcarosol)
Dark clay loam over abundant 'soft lime'. >10% carbonate is the cut off between this and M2 soils.

E3 Brown or grey cracking clay (Brown-Grey Vertosol)

F2 Sandy loam over poorly structured brown or dark clay (Brown-Dark Sodosol-Chromosol)
Topsoil <30 cm over a poorly structured subsoil. Loamy, often sandy loam, to clay loamy texture contrast soil with a sodic/dispersive/poorly structured brown clayey subsoil. Often sandy loam, usually with a bleached horizon, and thin topsoil over a poorly structured B.

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.

I1 Highly leached sand (Fragic, Pipey, Aeric Podosol)
Grey sand with a very thick bleached A2 layer, over dark brown and yellow massive soft to semi-hard clayey sand (coffee rock), grading to softer yellow and brown sand to sandy clay loam from about 80 cm.

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 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**

WW Water.

Further information: DEWNR Soil and Land Program