

# MOB Monbulla Land System

**Area:** 217.2 km<sup>2</sup>

**Landscape:** Corridor plains southwest of Bool Lagoon, with sandy rises and low dunes and swampy flats

**Annual rainfall:** 625 – 670 mm average

**Geology:** Pleistocene Padthaway Formation calcareous lacustrine clays on flats, with Pleistocene Bridgewater Formation calcreted calcarenite stranded beach ridge deposits on low ranges.

**Main soils:**

- G3** (29%) Thick sand over clay (sandy Brown-Red Chromosol-Sodosol)
- N3** (16%) Wet soil (non to moderately saline) (Sodosolic-Calcarosolic-Dermosolic Hydrosol)
- B7** (14%) Shallow sand over clay on calcrete (sandy Petrocalcic Sodosol-Chromosol)
- G4** (10%) Sand over poorly structured clay (sandy Brown-Red Sodosol-Chromosol)

**Minor soils:**

- B5** (6%) Shallow dark clay loam on limestone (Petrocalcic Black-Grey Dermosol)
- I1** (5%) Highly leached sand (Aeric Podosol)
- H3** (5%) Bleached siliceous sand (sandy Bleached Tenosol)

**Summary:** The G3 and G4 sand over clay soils which are widespread, occurring on sand plains and low rises mostly, are susceptible to seasonal waterlogging, have mostly acidic sand surfaces and have relatively low, inherent fertility in the surface. Wet (N3) soils occupy 16% of the area and are indicative of the swampy nature of the land system. The other most common soils are B7 soils, or shallow sand over poorly structured clay on calcrete, which have low water holding capacity as well as being poorly drained.

**Soil Landscape Unit summary:** Monubulla Land System (MOB)

SLU	% of area	Component	Main soils	Prop#	Notes
MRB	0.2	Undulating plain	B6B7G3	D	Gently undulating plains with shallow sand over red clay, or poorly structured brown clay in low parts, on calcrete; or deep sand over brown clay; 10-30% deep siliceous sandy rises. Main soils: <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> , <u>Sand over friable brown clay on calcrete - B7</u> and <u>Thick sand over clay - G3</u> .
MYAA	0.2	Rise	B6	D	<b>MYAA</b> Plains with low dune core topography with shallow, texture contrast, sandy loam over red clay on calcreted calcarenite; 10-30% gradational red clay loam over red clay, deep or shallow over calcrete, or deep sand over brown clay. <10% rises with bare calcrete outcrop or very shallow calcareous clay loam over calcrete; 10-30% with shallow loam over red clay on calcrete. <b>MYB</b> Gently sloping rises with soils as above and <10% bare calcrete rises or with shallow soils as above. <b>MYH</b> Gently sloping sandy rises, mostly with deep sand over brown clay, but often deep siliceous bleached acid sand; 10-30% thin sand over poorly structured brown clay. 20-30% rises with shallow texture contrast sandy loam over red clay on calcrete. <10% rises with calcrete outcrop and very shallow soils as for <b>MYB</b> . <10% depressions mostly with deep sand over brown clay; 10-30% thin sand over poorly structured clay, or deep acid bleached sand.
		Outcrop	RRB2	M	
MYB	0.8	Rise	B6	D	
		Outcrop	RRB2	M	
MYH	0.8	Sandy rise	G3H3	E	
		Rise	B6	C	
		Outcrop	RRB2	M	
		Depression	G3	M	



					<p>Main soils:  <b>Rises:</b> <u>Shallow sandy loam over red-brown clay on calcrete</u> - <b>B6</b>.  <b>Outcrops:</b> <u>Rock or exposed calcrete</u> – <b>RR</b> and <u>Shallow calcareous loam on calcrete</u> - <b>B2</b>.  <b>Sandy rises:</b> <u>Thick sand over clay</u> - <b>G3</b> and <u>Bleached siliceous sand</u> - <b>H3</b>.  <b>Depressions and swales:</b> <u>Thick sand over clay</u> - <b>G3</b>.</p>
NDD	0.2	Plain	G3B7	V	<p>Plains with deep sandy loam over brown clay or over poorly structured brown clay on calcrete. 20-30% sandy rises with deep sand over yellow-brown clay or deep sand with organic pan/coffee rock, which impedes drainage.</p> <p>Main soils:  <b>Plains and depressions:</b> <u>Thick sand over clay</u> - <b>G3</b> and <u>Sand over friable brown clay on calcrete</u> - <b>B7</b>.  <b>Sandy rises:</b> <u>Thick sand over clay</u> - <b>G3</b> and <u>Wet highly leached sand</u> - <b>I2</b>.</p>
		Sandy rise	G3I2	C	
NjA	2.5	Plain	B7	D	<p>Plains with shallow sandy loam over poorly structured brown clay on calcrete; 10-30% deep soil with thin sand over poorly structured brown clay. &lt;10% swamps with deep sandy clay loam over brown clay, or shallow dark clay loam over dark clay on calcrete; 10-30% wet soils or thin sand over brown clay.</p> <p>Main soils:  <b>Plains:</b> <u>Sand over friable brown clay on calcrete</u> - <b>B7</b>.  <b>Swamps:</b> <u>Deep friable gradational clay loam</u> - <b>M2</b> and <u>Shallow dark clay loam on limestone</u> - <b>B5</b>.</p>
		Swamp	M2B5	M	
NkK	14.2	Plain	B7G3	V	<p>Plains with shallow sand over poorly structured brown clay on calcrete, or deep sand over brown clay. 20-30% swamps with mostly wet soils and often deep clay loam grading to dark calcareous clay. &lt;10% sandy rises with deep bleached acid strongly water repellent sand; 10-30% less well drained with organic pans; or shallow bleached sand, often over poorly structured brown clay on calcrete.</p> <p>Main soils:  <b>Plains:</b> <u>Sand over friable brown clay on calcrete</u> - <b>B7</b> and <u>Thick sand over clay</u> - <b>G3</b>.  <b>Swamps:</b> <u>Wet clay loam</u> - <b>N3</b>; <u>Gradational dark clay loam</u> – <b>C5</b>.  <b>Sandy rises:</b> <u>Highly leached sand</u> - <b>I1</b> and <u>Bleached siliceous sand</u> - <b>H3</b>.</p>
		Swamp	N3C5	C	
		Sandy rise	I1H3	M	
NMF	3.2	Plain	B7B5	V	<p><b>NMF</b> Plains with mostly shallow sandy loam over poorly structured brown clay on calcrete, but often shallow dark clay loam over dark clay on calcrete; 10-30% wet soils in depressions, or deep bleached sand on rises, or shallow bleached sand on calcrete. 10-20% swamps with shallow dark clay loam over dark clay on calcrete, mostly wet.</p> <p><b>NMK</b> Plains with mostly shallow sandy loam over poorly structured brown clay on calcrete; 10-30% thin sand over deep, poorly structured brown clay. Co-dominant swamps with sandy clay loam over dark clay; deep or shallow over calcrete; 10-30% wet soils or shallow sand over poorly structured brown clay. &lt;10% sand rises with deep sand, mostly over brown clay; 10-30% deep bleached sand, or shallow sand over poorly structured brown clay.</p> <p>Main soils:  <b>Plains:</b> <u>Sand over friable brown clay on calcrete</u> - <b>B7</b> and <u>Shallow dark clay loam on limestone</u> - <b>B5</b>.  <b>Swamps:</b> <u>Deep friable gradational clay loam</u> - <b>M2</b> and <u>Shallow dark clay loam on limestone</u> - <b>B5</b>.  <b>Sandy rises:</b> <u>Thick sand over clay</u> - <b>G3</b>.</p>
Swamp	N3B5	L			
NMK	8.3	Plain	B7	E	
		Swamp	M2B5	E	
		Sand rise	G3	M	



NmA	3.5	Plain	G4	D	<p><b>NmA</b> Plains with shallow sandy loam over poorly structured brown clay; 10-30% shallow dark clay loam over dark clay on calcrete. &lt;10% swamps with shallow dark clay loam over dark clay on calcrete or shallow sand over poorly structured brown clay; 10-30% wet soils.</p> <p><b>NmG</b> Depressions with often wet, shallow sand over poorly structured brown clay; 10-30% shallow dark clay loam over dark clay on calcrete.</p> <p>Main soils:  <b>Plains:</b> <u>Sand over yellow and brown clay</u> - <b>G4</b>.  <b>Swamps and depressions:</b> <u>Shallow dark clay loam on limestone</u> - <b>B5</b>, <u>Sand over yellow and brown clay</u> - <b>G4</b> and <u>Wet clay loam</u> - <b>N3</b>.</p>
		Swamp	B5G4	M	
NmG	0.1	Depression	G4N3	D	
NnA	1.3	Plain	B5	D	
		Swamp	B5G4	M	
NnG	1.8	Depression	B7B5	D	
NRD	0.02	Plain	G3G5	D	
		Sandy rise	I2H3G3	M	
NSD	4.0	Plain	G3M4	D	
		Sandy rise	I2H3G3	M	
		Swamp	G3N3B5	M	
NSF	0.2	Plain	G3G4	V	
		Swamp	G3N3B5	C	
NSG	8.7	Drainage depression	N3G3	D	
NSK	1.0	Plain	G3G4	E	
		Swamp	G3N3B5	E	
		Sand rise	G3	M	
NSS	5.1	Plain	G3G4	E	
		Swamp	G3N3B5	C	
		Sand rise	G3	L	



NTD	0.8	Plain	G3	D	<p><b>NTD</b> Plains with mostly deep acid sands over acid yellow-brown clay. &lt;10% sandy rises with deep, water-repellent, bleached acid sand. &lt;10% swamps with often wet, deep sand over brown clay or shallow dark clay loam on clay on calcrete.</p>
		Sandy rise	I1H3	M	
		Swamp	G3N3B5	M	
NTG	0.1	Depression	G3N3	D	<p><b>NTG</b> Drainage depressions with deep sand over brown clay, often wet.</p>
NTP	6.2	Plain	G3	V	<p><b>NTP</b> Plains with soils as for <b>NTD</b>; 10-20% sandy rises; &lt;10% swamps.</p>
		Sandy rise	I1H3	L	
		Swamp	G3N3B5	M	
NTS	0.7	Plain	G3	E	<p><b>NTS</b> Plains with soils as for <b>NTD</b>; co-dominant sandy rises; 20-30% swamps.</p> <p>Main soils:</p> <p><b>Plains:</b> <u>Thick sand over clay</u> - <b>G3</b>.</p> <p><b>Sandy rises:</b> <u>Highly leached sand</u> - <b>I1</b> and <u>Bleached siliceous sand</u> - <b>H3</b>.</p> <p><b>Drainage depressions:</b> <u>Thick sand over clay</u> - <b>G3</b> and <u>Wet clay loam</u> - <b>N3</b>.</p>
		Sandy rise	I1H3	E	
		Swamp	N3	C	
NUA	0.4	Plain	G3F1	D	<p><b>NUA</b> Plains with deep usually acid, sand over brown clay; or sandy loam over dark brown clay; 10-30% shallow sandy loam over calcreted calcarenite.</p>
NUD	5.2	Plain	G3F1	V	
		Sand rise	G3	M	
NUP	0.5	Swamp	G3N3B5	M	<p><b>NUD</b> Plains. &lt;10% sandy rises with deep sand over brown clay. &lt;10% swamps with often wet, deep sand over brown clay or shallow dark clay loam on clay on calcrete.</p> <p><b>NUP</b> Plains with thick or thin sand over poorly structured brown clay. 20-30% sandy rises; &lt;10% swamps.</p> <p>Main soils:</p> <p><b>Plains:</b> <u>Thick sand over clay</u> - <b>G3</b>, <u>Sand over yellow and brown clay</u> - <b>G4</b> and <u>Loam over brown or dark clay</u> - <b>F1</b>.</p> <p><b>Sandy rises:</b> <u>Thick sand over clay</u> - <b>G3</b>.</p> <p><b>Swamps:</b> <u>Thick sand over clay</u> - <b>G3</b>, <u>Wet clay loam</u> - <b>N3</b> and <u>Shallow dark clay loam on limestone</u> - <b>B5</b>.</p>
		Plain	G3G4	V	
		Sand rise	G3	C	
NvF	0.1	Swamp	G3N3B5	M	<p><b>NUP</b> Plains with thick or thin sand over poorly structured brown clay. 20-30% sandy rises; &lt;10% swamps.</p> <p>Main soils:</p> <p><b>Plains:</b> <u>Thick sand over clay</u> - <b>G3</b>, <u>Sand over yellow and brown clay</u> - <b>G4</b> and <u>Loam over brown or dark clay</u> - <b>F1</b>.</p> <p><b>Sandy rises:</b> <u>Thick sand over clay</u> - <b>G3</b>.</p> <p><b>Swamps:</b> <u>Thick sand over clay</u> - <b>G3</b>, <u>Wet clay loam</u> - <b>N3</b> and <u>Shallow dark clay loam on limestone</u> - <b>B5</b>.</p>
		Plain	G3G2G5	V	
		Sand rise	G3	C	
NZD	0.4	Swamp	N3M2	L	<p><b>NvF</b> Plains with thin sand, or occasionally loam, over poorly structured brown clay. 10-20% swamps with often wet, dark grey clay loam over often poorly structured dark brown clay.</p> <p>Main soils:</p> <p><b>Plains:</b> <u>Thick sand over clay</u> - <b>G3</b>, <u>Bleached sand over sandy clay loam</u> - <b>G2</b> and <u>Sand over acidic clay</u> - <b>G5</b>.</p> <p><b>Swamps:</b> <u>Wet clay loam</u> - <b>N3</b>, <u>Deep friable gradational clay loam</u> - <b>M2</b> and <u>Deep hard gradational sandy loam</u> - <b>M4</b>.</p>
		Plain	G4	V	
		Sandy rise	G5I2	M	
NZN	1.2	Swamp	N3	M	<p><b>NZD</b> Plains with acid sand over poorly structured, occasionally acid, brown clay. &lt;10% sandy rises with deep acid sand, mostly over acid brown clay. &lt;10% swamps with wet, dark organic loam over clay.</p>
		Plain	G3	V	
		Sandy rise	G5I2	L	
NZN	1.2	Swamp	M2B5	M	<p><b>NZN</b> Plains with deep sand over brown clay; 10-30% thin sand over brown clay. 10-20% sandy rises with soils as for <b>NZD</b>. &lt;10% swamps with sandy clay loam over dark clay, deep or shallow on calcrete; 10-30% wet soils, or shallow sand over poorly structured brown clay.</p>
		Plain	G3	V	
		Sandy rise	G5I2	L	
NZN	4.1	Swamp	N3	C	<p><b>NZN</b> Plains with thin sand over poorly structured brown clay. 20-30% sandy rises with deep, acidic, bleached sand over acid brown clay, or with organic pans in subsoils. 20-30% swamps with wet, dark organic loam over dark clay.</p> <p>Main soils:</p> <p><b>Plains:</b> <u>Sand over yellow and brown clay</u> - <b>G4</b> or <u>Thick sand over clay</u> - <b>G3</b>.</p> <p><b>Sandy rises:</b> <u>Sand over acidic clay</u> - <b>G5</b> and <u>Wet highly leached sand</u> - <b>I2</b>.</p> <p><b>Swamps:</b> <u>Wet clay loam</u> - <b>N3</b> or <u>Deep friable gradational clay loam</u> - <b>M2</b> and <u>Shallow dark clay loam on limestone</u> - <b>B5</b>.</p>
		Plain	G4	V	
		Sandy rise	G5I2	C	



OFB	1.4	Dune	I1H3	D	<p><b>OFB</b> High dunes with deep, water repellent acid, bleached siliceous sand. &lt;10% stony ranges with shallow sandy loam, often over red clay, on calcreted calcarenite; 10-30% on poorly structured clay in swales and lower slopes.</p> <p><b>OFC</b> Dunes with deep, bleached, acid, water repellent, siliceous sand.</p> <p><b>OFD</b> Low dunes as above.</p> <p>Main soils:  <b>Dunes:</b> <u>Highly leached sand - I1</u>; <u>Bleached siliceous sand - H3</u>.  <b>Stony ranges:</b> <u>Shallow sandy loam on calcrete - B3</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u>.</p>
		Stony range	B3B6	M	
OFC	0.6	Dune	I1	D	
OFD	3.9	Low dune	I1	D	
OHC	1.5	Dune	I1H3	D	
		Stony rise	B3	M	
OPG	2.4	Low dune	G2G3	V	
		Swale	B7G3	C	
OPK	0.4	Sand spread	G3	D	
		Sand rise	G3H3	M	
OQD	0.2	Sand dune	H3	D	
OQF	0.2	Sand dune	H3	V	
		Sand rise	G3H3	C	
OQG	0.3	Sand dune	H3	V	
		Sand rise	G3H3	C	
OQJ	0.8	Low dune	H3I1	E	
		Plain	G3H3I2	E	
OQq	0.3	Sand dune	H3	V	
		Sand	G3H3	C	
		Depression	G3	M	
OQt	1.3	Sand dune	H3	E	
		Sand rise	G3H3	E	
		Depression	G4	L	



Xq-	2.1	Swamp	N3	D	Swamps with wet clay loam over dark clay; 10-30% water filled. Main soils: <b>Swamps:</b> <u>Wet clay loam</u> - <b>N3</b> .
Xu-	0.04	Swamp	N3WW	D	Swamps with wet clay loam over dark clay, often water filled. Main soils: <b>Swamps:</b> <u>Wet clay loam</u> - <b>N3</b> .
XuC	2.1	Swamp	N3	D	<b>XuC</b> Swamps with mostly non-peaty wet soils, but peats occur in up to 30% of areas. <b>Xud</b> Non-peaty clay loamy swamps with 20-30% sandy rises with deep sand over brown clay soils. <b>Xue</b> 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. <b>Xuf</b> Swamps as for XuC above, occasionally water filled, with stony rises and/or very shallow over calcrete.  Main soils: <b>Swamps:</b> <u>Wet clay loam</u> - <b>N3</b> and <u>Thick sand over clay</u> - <b>G3</b> . <b>Sandy rises:</b> <u>Thick sand over clay</u> - <b>G3</b> and <u>Wet highly leached sand</u> - <b>I2</b> . <b>Stony rises:</b> <u>Shallow calcareous loam on calcrete</u> - <b>B2</b> , <u>Shallow sandy loam on calcrete</u> - <b>B3</b> and <u>Shallow dark clay loam on limestone</u> - <b>B5</b> . <b>Clay-loamy rises:</b> <u>Deep friable gradational clay loam</u> - <b>M2</b> and <u>Deep hard gradational sandy loam</u> - <b>M4</b> .
Xud	4.0	Swamp	N3G3	V	
		Sandy rise	G3I2	L	
Xue	0.3	Swamp	N3	V	
		Rise	M2M4	C	
Xuf	1.2	Swamp	N3	V	
		Stony rise	B2B3B5	C	
Xw-	0.7	Swamp	N3WW	D	<b>Xw-</b> Swamps with wet clay loam over dark clay, often water filled.
Xwe	0.3	Swamp	N3WW	D	<b>Xwe</b> Swamps with wet clay loam over dark clay, often water filled. <10% lunettes with shallow texture contrast sandy loam over red clay or poorly structured brown clay, on calcreted calcarenite.  Main soils: <b>Swamps:</b> <u>Wet clay loam</u> - <b>N3</b> . <b>Lunettes:</b> <u>Shallow sandy loam over red-brown clay on calcrete</u> - <b>B6</b> and <u>Sand over friable brown clay on calcrete</u> - <b>B7</b> .
		Lunette	B6B7	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.
- 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.
- 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.
- F1** Loam over brown or dark clay (Brown-Dark Chromosol-Sodosol)  
Topsoil >30 cm over a poorly structured subsoil, or else, subsoil structure is good. Loamy to clay loamy texture contrast soil with brown clayey subsoil. Loamy, reasonable depth A, and OK structured clay subsoil.
- G2** Bleached sand over sandy clay loam (sandy Brown-Red Chromosol)  
Sandy texture contrast soil with a bleached A2 and a friable brown-red sandy clay loam to sandy loam subsoil.
- 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.
- G5** Sand over acidic clay (Sandy Brown Kurosol)  
Sandy texture contrast soil with a friable brown strongly acidic clayey to clay loamy subsoil. Very acidic soil; incipient Bh horizons; moderate depth topsoils. Some with 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.
- 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.
- 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](#)

