KBL Kybybolite Land System

Gently undulating plains in the Kybybolite area

Area: 565.6 km^2

Annual rainfall: 540 – 620 mm average

Geology: The Land System is formed on fine to medium clayey sandstone with ferruginous material of Plocene-Pleistocene Parilla Sand. This system includes the higher plains to the east of the Naracoorte Range.

Topography: The Kybybolite Land System is an undulating higher plain with loamy rises and minor sandy rises and shallow depressions. The depressions occur in the low-lying areas of the landscape, which are subject to inundation as there is limited external surface drainage. Surface drains move the run-off into larger drains, swamps, lagoons and the Mosquito, Naracoorte and Morambro Creeks. The Jessie Land System runs discontinuously through the Land System in a NNW-SSE orientation.

Elevation: 70 - 100 m

Relief: Maximum local relief 10 m

Soils:

Sandy soils (rises and flats)
G2 Sand over sandy clay loam
G3 Thick sand over clay
G4 Sand over poorly structured clay
H3 Bleached siliceous sand

Loamy soils Rises
F2 Sandy loam over poorly structured brown or dark clay
F1 Loam over brown or dark clay

Shallow soils
B4 Shallow red loam on limestone
B6 Shallow loam over red-brown clay on calcrete
B7 Shallow sand over clay on calcrete

Heavy soils
M2 Friable gradational clay loam
E3 Grey-brown cracking clay
N3 Wet soil (non-saline)

Main features: The Kybybolite Land System comprises a complex of arable sandy loam flats and rises, depressions with deep clayey soils, rises with minor shallow soils over calcrete and non-arable sandy rises. The deeper infertile sands are prone to water repellence and wind erosion. The Land System is arable but moderate limitations are caused by moderately low to moderate fertility on the rises. The sandy rises are marginal or unsuitable for cropping regularly.

Soil Landscape Unit summary: 44 Soil Landscape Units (SLUs) mapped in the Kybybolite Land System:

SLU	% of area	Main features
HaA HaB	9.0 6.8	Undulating higher plains with less than 10% swamps to gently undulating rises that have both sandy and loamy surfaces. Relief is up to 10 m and the slopes are 1 - 3%. **HaA** Very undulating loamy plains and 0-10% swamps **HaB** Sandy rises with 20 - 30% loamy rises Main soils: ***Plains and sandy rises:*** Sandy loam over poorly structured clay -**F2**, loam over brown or dark clay - **F1**, sand over poorly structured clay – **G4**, thick sand over clay - **G3**. These soils are deep, have moderate to moderately low fertility, moderate to high water holding capacity and are well to imperfectly drained. Water repellence and surface soil acidity are limitation on the sandy soils and there is also a slight limitation to root growth due to the dispersive subsoil clays. ***Swamps:*** Sandy loam over poorly structured clay -**F2**, friable gradational deep clay loam - **M2** and wet soil – **N3**. These soils are deep, have moderate fertility, high waterholding capacity and are poorly drained. There is a slight limitation to root growth due to the dispersive subsoil clays. ***Stony rises:*** Loam over brown or dark clay - **F1** and shallow loam over red-brown clay on calcrete - **B6**. These soils are moderately deep, have moderate to high fertility and waterholding capacity. Drainage is imperfect.
HbA HbB	1.8 2.4	Undulating higher loamy plains with less than minor depressions to gently undulating loamy surfaces. Relief is up to 10 m and the slopes are 1 - 3%. **HbA** Undulating loamy plains with 0-10% depressions **HbB** Undulating loamy rises with 10-20% loamy shallower soils Main soils: ***Plains:*** loam over brown or dark clay - **F1** and sandy loam over poorly structured clay -**F2**. These soils are deep, have moderate to moderately low fertility, moderate to high waterholding capacity and are well to imperfectly drained. Water repellence and surface soil acidity are limitation and there is also a slight to moderate limitation to root growth due to the dispersive subsoil clays. ***Depressions:*** sandy loam over poorly structured clay -**F2**, friable gradational deep clay loam - **M2** and wet soil – **N3**. These soils are deep, have moderately low fertility, high water holding capacity and are poorly drained. There is a high limitation to root growth due to the dispersive subsoil clays. ***Shallower loamy rises:*** loam over brown or dark clay - **F1** and shallow red loam on limestone - **B4**. These soils are moderately deep, have high fertility, moderate waterholding capacity and are well drained.
HcA	0.4	Undulating heavy plains with 20-30% depressions. Main soils: ***Plains:*** sandy loam over poorly structured clay -**F2**, loam over brown or dark clay - **F1**. These soils are deep, have moderate to moderately low fertility, moderate to high water holding capacity and are slightly imperfectly drained. Surface soil acidity is a limitation and there is moderate limitation to root growth due to the dispersive subsoil clays. ***Depressions:*** Friable gradational deep clay loam - **M2**. They are deep, have high fertility and waterholding capacity and are imperfectly drained. There is a moderate limitation to root growth due to the dispersive subsoil clays.
HeA HeB	3.1 5.5	Sandy loam plains and rises with up to 30% depressions. **HeA** Undulating plain with 20-30% depression **HeB** Undulating rises with 20-30% depressions Main soils: ***Plains:*** Sandy loam over poorly structured clay -**F2**, loam over brown or dark clay - **F1**. These soils are deep, have moderate to moderately low fertility, moderate to high waterholding capacity and are slightly imperfectly drained. Surface soil acidity is a limitation. There is moderate limitation to root growth due to the dispersive subsoil clays. ***Depressions:*** Friable gradational deep clay loam - **M2**. They are deep, have high fertility and waterholding capacity and are imperfectly drained. There is a moderate limitation to root growth due to the dispersive subsoil clays.

HhA	2.2	Undulating loamy plain with 0-10% depressions. Main soils: ***Plains:*** Sandy loam over poorly structured clay -**F2**, loam over brown or dark clay - **F1**. Soils are deep, have moderate to moderately low fertility, moderate to high waterholding capacity and are slightly imperfectly drained. Surface soil acidity is a limitation and there is moderate limitation to root growth due to the dispersive subsoil clays. ***Depressions:*** Friable gradational deep clay loam - **M2**. They are deep, have high fertility and waterholding capacity and are imperfectly drained. There is a moderate limitation to root growth due to the dispersive subsoil clays.
HiB	0.5	Gently undulating sandy rises with 20-30% loamy rises. Relief is up to 10 m and the slopes are 1- 3%. Main soils: ***Sandy rises:*** Thick sand over clay - **G3**, bleached siliceous sand - **H3** and bleached sand over sandy clay loam - **G2**. These soils are deep, have moderately low fertility, moderate waterholding capacity and rapid drainage. Water repellence, soil acidity and the susceptibility to wind erosion are limitations. ***Loamy rises:*** Loam over brown or dark clay - **F1**. They are deep, have moderate fertility and water holding capacity and are slightly imperfect drainage.
HkA HkB	0.3 6.3	Level plain to gently undulating rises consisting of loamy soils and limited shallow soils. **HkA** Level loamy plain **HkB** Loamy rises with 10 –20 % shallow loamy soils Main soils: loam over brown or dark clay - **F1**, sandy loam over poorly structured clay - **F2**, shallow red loam on limestone - **B4** and shallow calcareous loam on limestone - **B2**. The main soils are moderately deep, have moderate fertility, high waterholding capacity and are well drained. Soil acidity is a slight limitation. The shallow loamy soils have high fertility, moderately low water holding capacity and are well drained. Surface rockiness and shallowness of soil may be a limitation.
HmE	0.7	Loamy to clay loamy depressions that are seasonally wet and found throughout the Land System. Main soils: friable gradational clay loam - **M2**, sandy loam over poorly structured clay - **F2** and wet soil **- N3**. These soils are deep, have moderate fertility and high waterholding capacity and are poorly drained. There is high limitation to root growth due to the dispersive subsoil clays.
HoB	0.2	Undulating loamy rises with 20-30% stony rises. Main soils: loam over brown or dark clay - **F1**, shallow red loam on limestone - **B4**, shallow sand over clay on calcrete - **B7** and shallow calcareous loam on calcrete - **B2**. These soils are shallow to moderate in depth, have high fertility, moderately low to moderate fertility and are well drained. The deeper soils have acidic surfaces and the shallow soils have a slight limitation to root growth due to some dispersive subsoil clays. Rockiness may also be a slight limitation.
HuB	8.0	Undulating rises with 20-30% loamy rises and 0-10% swamps. Main soils: loam over brown or dark clay - **F1**, sandy loam over poorly structured clay - **F2**, friable gradational clay loam - **M2**, thick sand over clay - **G3**, wet soil **- N3** and shallow red loam on limestone - **B4**. These soils are moderately deep to deep, have moderate to high fertility and waterholding capacity and are well drained. The swamps are poorly drained. The surface soils are acidic and the swampy soils have a moderate limitation to root growth due to the dispersive subsoil clays.
HwA HwB	0.4 4.5	Undulating sandy loam plains and rises with limited depressions **HwA** Sandy loamy plain **HwB** Sandy to sandy loam rises, with 30-50% loamy rises and 10-20% depressions. Main soils: loam over brown or dark clay - **F1**, sandy loam over poorly structured clay - **F2** and thick sand over clay - **G3**. These soils are deep, have moderate to high fertility, high waterholding capacity and are well to slightly imperfectly drained. There is a slight to moderate limitation to root growth due to the dispersive subsoil clays. The depression is poorly drained.
HxA HxE	6.3 2.3	Level plains with mainly texture contrast soils (grey subsoil) with clayey low lying areas. **HxA** Level plain with less than 10% swamps **HxE** Depression

		Main soils: sandy loam over poorly structured clay - **F2**, friable gradational clay loam - **M2** and wet soil **- N3**. These soils are deep, have moderate fertility and high waterholding capacity. The plains are imperfectly drained and the swamps and depressions poorly to very poorly drained. There is a moderate to high limitation to root growth due to the dispersive subsoil clays in the plains and depressions respectively. The swamps and depressions are seasonally inundated for up to 3 months.
HyA HyE	6.5 0.1	Level plain with mainly texture contrast soils (grey and brown subsoil clay) and 0-10% depressions. **HyA** Loamy plain with 0-10% depression **HyE** Depression Main soils: sandy loam over poorly structured clay - **F2**, loam over brown or dark clay - **F1** and friable gradational clay loam - **M2**. The soils are deep, have moderate fertility and high waterholding capacity. The plains are imperfectly drained and the depressions poorly drained. There is a moderate to high limitation to root growth due to the dispersive subsoil clays in the plains and depressions respectively.
HzA HzE	25 0.1	Sandy loam plain with 0-10% depressions (**HzA**) and depressions (**HzE**). Main soils: sandy loam over poorly structured clay - **F2**, loam over brown or dark clay - **F1** and friable gradational clay loam - **M2**. The soils are deep, have moderate fertility and high waterholding capacity. The plains are imperfectly drained and the depressions poorly drained. There is a slight to severe limitation to root growth due to the dispersive subsoil clays on the plains and depressions respectively.
MYA	0.05	Gently sloping undulating loamy plain with 0-10% stony rises. Main soils: shallow loam over red clay on calcrete - **B6**, shallow red loam on limestone - **B4**, shallow calcareous loam on calcrete - **B2**, limestone outcrop - **RR** and shallow sandy loam on limestone - **B3**. The loamy soils are shallow to moderate in depth, have high fertility, moderately low waterholding capacity and are well drained. The shallow stony soils are very shallow, have moderate fertility and low water holding capacity. The soils are calcareous throughout and rockiness will be a limitation with up to 50% rock in concentrated areas.
OQG OQJ	0.1 0.05	Low dunes and sandy rises with up to 90% sand dune coverage. **OQG** At least 60% low dune coverage with up to 40% sandy rises **OQD** 50% low dune coverage & 50% sandy rises Main soils: bleached siliceous sand - **H3**, thick sand over clay - **G3**, bleached sand over sandy clay loam - **G2** and sand over poorly structured clay - **G4**. These soils are deep, have moderately low to low fertility, moderate waterholding capacity and are rapidly to well drained. Severe water repellence, soil acidity and the susceptibility to wind and water erosion (especially on the dunes) are limitations.
TIE	0.1	Low lying depression of greater than 50% heavy surface textured soils and grey sodic subsoil clays. Main soils: wet soil - **N3**, deep friable gradational clay loam - **M2**, and brown-grey cracking clay - **E3**. These soils are deep, have high fertility and waterholding capacity. Drainage is poor. There is a slight limitation to root growth in the surface as the soils are hardsetting and a moderate limitation in the subsoil due to the dispersive subsoil clays. The surface soil is acidic and the area could be inundated for several months.
TMA TME	1.7 0.1	Low lying areas with 10-20% swamps (**TMA**) and depressions (**TME**) within an undulating plain. Greater than 50% of the soils are heavy surface textured soils and greater than 10% are texture contrast soils. Main soils: deep friable gradational clay loam - **M2**, brown-grey cracking clay - **E3**, sandy loam over poorly structured brown or dark clay - **F2**, sand over poorly structured clay - **G4** and wet soil - **N3**. These soils are deep, have high fertility and waterholding capacity. Drainage is imperfect to poor. There is a slight limitation to root growth in the surface as the soils are hardsetting and a slight to high limitation in the subsoil due to the dispersive subsoil clays. The surface soil is acidic and the subsoil is alkaline at depth.
TNA TNE	0.8 0.1	Low lying areas with 20-30% swamps (**TNA**) and depressions (**TNE**) within an undulating plain. Greater than 80% of the soils are heavy surfaced textured soils and less than 20%

		are texture contrast soils. Main soils: deep friable gradational clay loam - **M2**, brown-grey cracking clay - **E3**, sandy loam over poorly structured brown or dark clay - **F2** and wet soil - **N3**. These soils are deep, have high fertility and waterholding capacity. Drainage is imperfect to poor. There is a slight limitation to root growth in the surface as the soils are hardsetting and a high to severe limitation in the subsoil due to the dispersive subsoil clays. The surface soil is acidic. The swamps and depressions are inundated for up to 3 months.
XRC XRT XRe	0.4 0.2 0.1	Clayey drainage depressions and swamps with 20-30% lunettes. **XRC** Wet swamps including The Brim, Dine & Gurmackamuck Swamps **XRT** Drainage depression **XRe** Swamp with 20-30% lunette Main soils: ***Swamps and depressions:*** Friable gradational clay loam - **M2**, wet soil - **N3** and loam over brown or dark clay - **F1**. These soils are deep, have moderate fertility, high waterholding capacity and are imperfect to poorly drained. They are seasonally inundated for up to 3 months. ***Lunettes:*** Loam over brown or dark clay **F1**, shallow loam over red-brown clay on calcrete - **B6** and sandy loam over poorly structured brown or dark clay - **F2**. These soils are moderately deep, have moderate fertility, moderate water holding capacity and are well drained. This land is not suitable for agriculture production.
XXB XXT	0.02 0.3	Eroded watercourses and drainage depressions that lead into the creek systems and swamps. **XXB** Drainage depressions leading into Mosquito & Morambro Creek **XXT** Drainage depression into swamp Main soils: thick sand over clay - **G3**, sandy loam over poorly structured brown or dark clay - **F2**, sand over poorly structured clay - **G4**, friable gradational clay loam - **M2,** wet soil - **N3**. The soils are deep, have moderate fertility and high waterholding capacity. Drainage is imperfect to poor. This land is not suitable for agriculture production.
XaC XaJ XaK XaT	0.04 0.4 1.8 0.1	Mosquito, Naracoorte, Morambro and Yelloch Creeks, swamps and drainage depressions. **XaC** Swamp **XaJ** Mosquito Creek **XaK** Morambro, Naracoorte and Yelloch Creeks **XaT** Drainage depression Soils within creek system vary however the main soils are wet soil - **N3**, friable gradational clay loam - **M2**, sandy loam over poorly structured brown or dark clay - **F2**. These soils are deep, have moderate fertility, high waterholding capacity and are poorly to very poorly drained. Dispersive subsoil clays have a slight to high limitation. The Creeks in some areas are permanently filled. This landscape unit is not suitable for agricultural production.
Xe-	0.2	Small texture contrast lunettes surrounding depressions or swamps that are not seasonally inundated for as long as previously. Main soils: ***Lunettes:*** loam over brown or dark clay - **F1**, shallow loam over red-brown clay on calcrete - **B6** and sandy loam over poorly structured brown or dark clay - **F2**. These soils are moderately deep, have moderate fertility, moderate waterholding capacity and are well drained. This land is not suitable for agriculture production. ***Swamps:*** The main soils are wet soil - **N3**. These soils are deep with moderately low fertility and high waterholding capacity. Drainage is poor to very poor. There is a high limitation for root growth due to the dispersive subsoil clays. The swamps are underwater for greater than 3 months.
Xq- XqV	0.2 0.04	Seasonally wet swamps including Gum Swamp (**Xq-**). Main soils: wet soil - **N3**. These soils are deep, have moderate fertility, high waterholding capacity and are poorly to very poorly drained. The swamps are underwater for greater than 3 months. The swamps with moderate salinity are minor (**XqV**) and there may be some salt tolerant species evident. This landscape unit is not suitable for agricultural production only opportunity grazing.
Xu- XuC	0.1 0.4	Non-saline wet swamps incl. Mullinger (**XuC**), Nellan (**Xu-**) and Waggie Swamps (**XuC**). Main soils: wet soil - **N3**, friable gradational clay loam - **M2** and sandy loam over poorly structured brown or dark clay - **F2**. These soils are deep; have moderately to high fertility and high waterholding capacity. Drainage is poor to very poor. There is a slight limitation for root growth due to the

		dispersive subsoil clays. The swamps are underwater for up to 3 months of the year.
ZOF	0.1	Small waterlogged depression abutting the eastern edge of the Jessie Land System. Within the depression there is an extensive swamp. Main soils: sandy loam over poorly structured brown or dark clay - **F2**, loam over brown or dark clay - **F1** and wet soil - **N3**. The soils are deep, have moderate to low fertility, high waterholding capacity and imperfect to very poor drainage. There is a slight to high limitation to root growth due to the dispersive subsoil clays. There is also a slight to moderate limitation to root growth due to surface hardsetting. The swamps are saline in the subsoil.

Detailed soil profile descriptions:

(In alphabetic order)

B2 Shallow calcareous loam on calcrete (Petrocalcic, Lithocalcic Calcarosol)
Thin stony calcareous sandy loam to clay loam, becoming more clayey and rubbly with depth, overlying calcreted calcarenite shallower than 50 cm.

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.

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

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.

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

F1 Loam over brown or dark clay (Melanic, Hypercalcic, Black/Brown Chromosol)
Medium thickness dark brown sandy loam over a thin to medium sand layer over a structured brown to black clay grading to a brown mottled clay with limestone segregations at depth.

F2 Sandy loam over brown or dark poorly structured clay (Mottled, Mesonatric, Grey/Black Sodosol)
Medium thickness brown sandy loam over a thin to medium thickness pale sand layer over a columnar structured dispersive grey to black clay grading to a brown mottled clay with depth.

G2 Sand grading to sandy clay loam (Mesotrophic, Yellow Kandosol)
Thick bleached sand, organically darkened at surface, grading to a yellow and red friable massive sandy clay loam.

G3 Thick sand over clay (Eutrophic / Calcic, Brown Chromosol)
Thick to very thick bleached sand to loamy sand with an organically darkened surface abruptly overlying a friable yellowish brown and red sandy clay.

G4 Sand over dispersive brown clay (Hypercalcic, Brown Sodosol)
Thin to medium thickness sand sharply overlying a brown and yellow or grey mottled dispersive clay with strong columnar structure, calcareous with depth.

H3 Bleached siliceous sand (Bleached-Orthic, Argic Tenosol)
Medium thickness organically darkened sandy surface over thick bleached sand over yellow sand continuing below 100 cm

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

N3 Wet soil - non to moderately saline (Dermosolic, Oxyaquic Hydrosol)
Medium thickness clay overlying dispersive grey clay with increasing pH at depth.

RR Bare rock

WW Water

(Grouped on landscape position)

Sandy soils (rises and flats)

G2 Bleached sand grading to sandy clay loam (Sandy Petrocalcic, Brown Chromosol-Kandosol)
Medium to thick sand with a bleached A2 layer abruptly overlying a brownish friable light sandy clay loam to sandy clay over calcreted calcarenite

G3 Thick sand over clay (Eutrophic, Mottled, Brown Chromosol/Sodosol)
Thick to very thick sand with a pale sand layer directly overlying a brownish clay

G4 Sand over poorly structured clay (Subnatric, Brown Sodosol)
Medium sand with a bleached A2 layer clearly overlying a hard columnar structured dispersive brown mottled clay.

H3 Bleached siliceous sand (Bleached-Orthic, Arenic, Basic Tenosol)
Medium to thick loose non-calcareous grey sand, grading to white sand then to yellowish sand, continuing below 150cm.

Loamy soils Rises

F2 Sandy loam over poorly structured clay (Mottled-Mesonatric, Grey-Brown Sodosol)
Thin to medium sandy loam to loamy sand abruptly overlying a hard columnar structured dispersive brown to grey medium clay.

F1 Loam over brown or dark clay (Mottled, Eutrophic Brown Chromosol/Sodosol)
Thick organically darkened sandy loam to clay loam over light brown sand directly overlying structured brown mottled clay

Shallow soils

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

B6 Shallow loam over red-brown clay on calcrete (Hypocalcic, Petrocalcic, Red Dermosol)
Medium thickness laom to clay loam over a red to red-brown clay directly overlying calcarenite within 50 cm

B7 Shallow sand over clay on calcrete (Mesotrophic, Petrocalcic, Grey/Brown Sodosol)
Medium thickness organically stained sand grading to bleached sand over a grey to brown sodic poorly structured clay directly overlying calcrete within 50 cm

Heavy soils

M2 Deep friable gradational clay loam (Mottled, Calcic, Black Dermosol)
Thin to medium thickness black clay loamy surface grading to black structured clay grading to a mottled grey calcareous clay at depth.

E3 Brown or grey cracking clay (Episodic, Gery Vertosol)
Very thin grey clayey surface over a sodic poorly structured grey clay with light grey and yellow/brown mottles to depth

N3 Wet soil (non to moderately saline) (Melanic, Dermosolic, Redoxic Hydrosol)
Medium thickness wet black clay grading to grey poorly structured clay with depth which can be slightly calcareous at depth

Further information: DEWNR Soil and Land Program