O'Connor soil – mottled soil in colluvium from Permian fine sandstone and minor dolerite, under dry forest

Site description

Occurrence: On mid-altitude sites between 250 and 650 m in the Great Western Tiers, where mean annual rainfall is in the 600-800 mm range
Parent Material: Colluvium from fine sandstone and minor dolerite
Landform: Midslopes and footslopes on hilly and steep terrain often capped with dolerite
Drainage Class: Imperfectly drained
Vegetation: Dry sclerophyll forest with *Eucalyptus amygdalina, E. ovata, E. viminalis, Acacia dealbata, Pteridium esculentum, Coprosma quadrifida* and *Olearia argophylla*

Distinguishing Soil Properties

Profile Features:

- Gradational or uniform profiles with silty loam textures near surface becoming silty clay textures deeper in the profile
- Strong and mottled subsoils – imperfect drainage

Chemical and physical features

- Medium total C and total P and high N in topsoil (0-30 cm)
- Moderate erodibility
- Permeability slow because of compact subsoils

Similar soils

- Soils 14.1 and 14.2, Forest Soils of Tasmania – prominent A2 horizons present
- Soil 13.1, Forest Soils of Tasmania – in mudstone
- Lake soil (Tasmanian forest soil fact sheet no. 8) – similar parent material, but soil is well drained or moderately well drained

Soil Degradation Potential

FACTOR	RATING OF DEGRADATION POTENTIAL
Erodibility:	Moderate to high
Compaction and puddling:	Moderate
Mixing:	Moderate
Nutrient depletion:	Moderate
Landslides:	Slight to Moderate
Flooding:	Negligible

Site Productivity

Low productivity primarily because of imperfect drainage and moderate nutrient levels, but soils occur in association with better-drained soils and soils in other parent materials (e.g. dolerite talus), so these limitations are localised

Soil Management

Soils on hilly and steep slopes are prone to erosion after clearing.
Snig tracks require matting if harvesting is by ground-based methods.
Harvesting should aim to keep topsoils intact to prevent erosion of subsoils.
For topsoil protection very hot burns should be avoided.

Native Forest Logging and Regeneration

LOGGING AND CLEARING: Matting and cording should be used on snig tracks as the soils are prone to rutting and mixing.
PREPARATION FOR REGENERATION:
Hot burning should be avoided. Disturbance by ground traffic is likely to provide enough sites for adequate germination and regeneration. Alternatively use light scarification.
SILVICULTURAL CONSIDERATIONS:
The favoured silvicultural management is partial logging, with low intensity burning.

Suitability for Plantations

Marginally suitable to **unsuitable** for plantations on slopes up to 14^{o} – limitations of drainage, trafficability and low productivity
CLEARING: Care must be taken to retain the surface soils
CULTIVATION: Ripping to break up firm subsoils may be beneficial
FERTILISER: N, P and S fertiliser is required at planting; secondary fertilisation may be necessary

Profile

Authors: P. D. McIntosh and C. Hawkins
Date: 30 October 2000
Location: 400 m below Millers Bluff Road, on Gunns roadline. Flat shelf 80 m wide below.
Map reference: Sheet 5036 (O'Connors) 123 608
Landform: Midslope of hillside 100 m long
Vegetation: *Eucalyptus amygdalina, E. ovata, E. viminalis, Acacia dealbata, Pteridium esculentum, Coprosma quadrifida, Olearia argophylla, Clematis aristata*
Parent material: Mixed colluvium from Permian fine sandstone and minor Jurassic dolerite
Drainage: Imperfectly drained
Slope: 30°
Aspect: West-northwest
Altitude: 535 m
Photographs: 11-00(1)-3a (profile); 11-00(1)-7a (site)
Australian Soil Classification: **Eutrophic Brown Kandosol**

A11	0-10 cm	Very dark brown (10YR2/2) (moist) silty loam (25% clay estimate); 10% pale brown (10YR6/3) inclusions 5-10 mm diameter (from tree overturn upslope); loose; strong 1-2 mm crumb structure; abundant fine to coarse roots; NaF 0/5.
A12	10-27 cm	Very dark brown (10YR2/2) (moist) silty loam (25% clay estimate); weak soil strength; strongly developed 2-5 mm granular structure; abundant fine to coarse roots; NaF 0/5.
B1	27-40 cm	Brown (7.5YR4/2) (moist) silty loam (30% clay estimate); 20% very dark brown (10YR2/2) inclusions 5-10 mm diameter; firm; weak 10-20 cm blocky and 3 mm granular structure; abundant fine to coarse roots; NaF 0/5.
B2	40-50 cm	Brown (7.5YR5/3) (moist) silty clay (45% clay estimate); 10% greyish brown (2.5Y5/2) mottles 5 mm diameter; very firm strength; weak 10-20 cm blocky structure; 5% angular sandstone and subrounded dolerite gravels 10-30 mm diameter; few fine to coarse roots; NaF 0/5.
B2g1	50-65 cm	Brown (10YR5/3) (moist) silty clay (40% clay estimate); strong; massive (breaking to very weak 30-50 mm blocky); 2% angular sandstone and subrounded dolerite gravels 10-30 mm diameter; many pores up to 3 mm diameter with silt coatings in pores; charcoal flecks; few medium roots; NaF 0/5.
B2g2	65-90+cm	Yellowish brown (10YR5/4) (moist) silty clay (40% clay estimate); 25% grey (5Y5/1) veins 8 mm diameter, mostly vertical, 3-5 cm spacing; strong; massive (breaking to very weak 30-50 mm blocky); 2% angular sandstone and subrounded dolerite gravels 10-30 mm diameter; one dolerite boulder 40 cm diameter; many pores up to 6 mm diameter with silt coatings in pores; some pores wet; charcoal flecks; few medium roots; NaF 0/5.

Note: within 50 m, on same slope, soils in dolerite talus occur.

Laboratory Analyses

Horizon	Depth (cm)	pH (H_2O)	Total C (%)	Total N (%)	C/N	Total P (mg/kg)	P retn. (%)	SO_4-S (mg/kg)	Water-stable aggregates (%)
A11	0-10	6.08	4.97	0.25	20	159	16	1	n.d.
A12	10-27	6.07	4.44	0.23	22	214	20	3	37
B1	27-40	6.05	4.89	0.23	21	72	12	1	39
B2	40-50	6.21	1.38	0.05	26	72	10	0	33
B2g1	50-65	6.23	0.51	0.02	26	58	11	1	13
B2g2	65-90+	6.12	0.66	0.02	33	54	10	1	8

Horizon	Depth (cm)	Exch. Ca (cmol(+)/kg)	Exch. Mg (cmol(+)/kg)	Exch. K (cmol(+)/kg)	Exch. Na (cmol(+)/kg)	CEC (cmol(+)/kg)	BS (%)
A11	0-10	12.36	3.43	0.95	0.11	20.3	83
A12	10-27	18.88	4.97	0.62	0.14	27.9	88
B1	27-40	5.45	3.66	0.50	0.14	11.8	83
B2	40-50	3.73	3.67	0.39	0.21	9.9	81
B2g1	50-65	3.11	3.83	0.25	0.22	9.5	78
B2g2	65-90+	2.21	4.66	0.15	0.38	8.7	85

Analytical methods were those of Blakemore et al. (1987), Laffan et al. (1996) and Rayment and Higginson (1992), with variation of methods for C, N and $S0_4$-S (details available from P. D. McIntosh, Forest Practices Board).

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