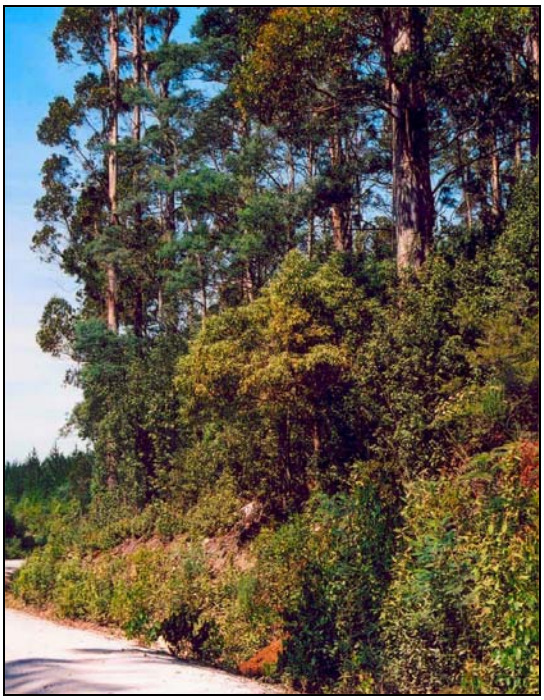
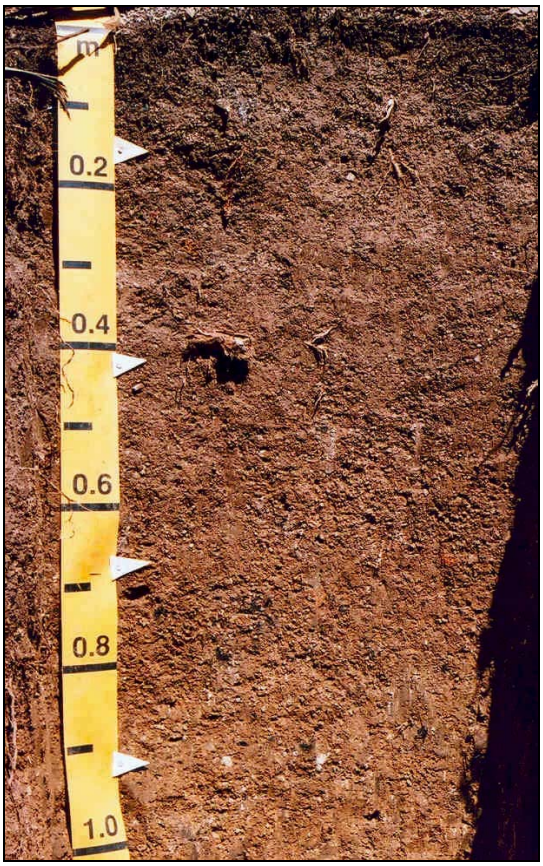
Stronach soil – gradational soil in granite under wet forest

Site description

Occurrence: In northeast Tasmania at <500 m altitude where mean annual rainfall is about 1000 mm or higher
Parent Material: In-situ granite and granite slope colluvium
Landform: Rolling and hilly land
Drainage Class: Well drained
Vegetation: Wet sclerophyll forest with dominant *Eucalyptus regnans, E. obliqua* and/or *E. viminalis* with an understorey of species such as *Pomaderris apetala, Bedfordia salicina, Olearia argophylla* and *Dicksonia antarctica*





Distinguishing Soil Properties

Profile Features:

- Gradational profile
- Brown colour throughout
- Sandy clay loam upper horizons over clayey subsoils
- Polyhedral and subangular blocky peds
- Low erodibility

Chemical and physical features

- High levels of total C, N and P in surface layer
- Well drained
- Moderate permeability

Similar soils

- Wurrawa soil (Forest soil fact sheet no. 19) – in granite under under dry forest
- Cuckoo soil (Forest Soils of Tasmania 11.4) – weak strength throught profile with granular peds; in granite at higher altitude under wet forest
- Diddleum soil (Grant et al. 1995) – gradational soil in granodiorite under wet forest

Previous descriptions

Stronach soils have been previously described in Forest Soils of Tasmania (soil 11.3) and in Grant et al. (1995)

Soil Degradation Potential

FACTOR	RATING OF DEGRADATION POTENTIAL
Erodibility:	Low; moderate in soils with coarse sandy loam A1 horizons; erodibility may be high in weathered rock at depth
Compaction and puddling:	Moderate
Mixing:	Moderate
Nutrient depletion:	Moderate
Landslides:	Slight – Moderate
Flooding:	Negligible

Site Productivity

High productivity

Soil Management

Where deep road cuttings are required, care needs to be taken as deeply weathered rock may have high erodibility, in contrast to the low or moderate erodibility of the surface soil.

The surface horizons of the soil contain high organic matter and nutrient levels and should be left intact as far as possible.

Native Forest Logging and Regeneration

LOGGING AND CLEARING: These soils are resistant to degradation provided the surface horizons are not excessvely disturbed. The soils are suitable for wet-weather logging provided they are not saturated. Steep slopes are generally suitable for cable harvest, provided streams do not have evidence of excessive rates of erosion.

PREPARATION FOR REGENERATION: Scarification or burning is required to prepare a seedbed.

SILVICULTURAL CONSIDERATIONS: Severe drought or frost can affect the success of regeneration where the surface soil layer has a coarse sandy loam texture.

Suitability for Plantations

Highly suitable for plantations on sites with slopes less than 11^{o} and generally suitable on slopes up to 19^{o}.

CLEARING: Dozer clearing must be done using a rake blade, to retain a cover of surface soil.

CULTIVATION: The clayey subsoil may be compact in some areas, and require ripping. Mound ploughing along the contour is preferred, and slopes $19–26^{o}$ should be spot cultivated.

FERTILISER TREATMENT: Fertilising planted seedlings is desirable.

Profile

Authors: P.D. McIntosh and M.D. Laffan
Date: 22 February 2005
Location: South side of Red Stump Road, Goulds Country
Map reference (AGD): Sheet 5844 (Spurrs Rivulet) 594200 5446400
Landform: Midslope of hillside 300 m long
Vegetation: Wet eucalypt forest with *Eucalyptus regnans, Bedfordia salicina, Coprosma quadrifida, Acacia dealbata*
Parent material: Slope colluvium* from granite
Drainage: Well drained
Slope: 19°
Aspect: North
Altitude: 230 m
Photographs: PDM 2-05-22 (site); 2-05-19 (profile)
Australian Soil Classification: **Melanic-Acidic Dystrophic Brown Dermosol**

A11	0–16 cm	Very dark greyish brown (10YR3/2) (moist) coarse sandy clay loam; weak strength; strong 5–10 mm polyhedral peds; 40% quartz gravels 2–4 mm diameter; abundant very fine and common medium roots; NaF 1/5.
A12	16–42 cm	Light olive brown (2.5Y3/3) (moist) clay loam; weak strength; strong 5–20 mm polyhedral peds; 25% quartz gravels 2–4 mm diameter; many very fine, few medium and few coarse roots; NaF 1/5.
B1	42–68 cm	Dark greyish brown (10YR4/2) (moist) clay loam; 20% very dark greyish brown (2.5Y3/2) inclusions 6 mm diameter introduced by earthworms; firm strength; strong 5–10 mm polyhedral peds; 25% quartz gravels 2–4 mm diameter; common very fine and few medium roots; NaF 2/5.
B2	68–92 cm	Dark yellowish brown (10YR4/4) (moist) coarse sandy clay loam; 35% very dark greyish brown (2.5Y3/2) inclusions 6 mm diameter introduced by earthworms; firm strength; strong 5–10 mm polyhedral peds; 40% quartz gravels 2–4 mm diameter; 5% charcoal fragments*; NaF 3/5.
B3	92–110 cm	Dark yellowish brown (10YR4/6) (moist) clay loam/loamy clay; 30% dark greyish brown (2.5Y4/2) inclusions 6 mm diameter introduced by earthworms; firm strength; moderate 20–30 mm subangular blocky peds breaking to 5–10 mm subangular blocky peds; 30% quartz gravels 2–4 mm diameter; 1% charcoal fragments; few very fine roots; NaF 3/5.

*The charcoal in the B2 horizon was dated at the Radiocarbon Dating Laboratory, University of Waikato, New Zealand (Wk16585) at 5443±yr BP. The fine nature of the charcoal fragments indicated that they were probably distributed by erosion rather than resulting from burning of roots in place. The date therefore indicates that the colluvium in which the soil is formed accumulated at this time or slightly later (as the charcoal may be derived from trees or wood that was several hundred years old at the time of slope erosion).

Horizon	Depth (cm)	pH (H_2O)	Total C (%)	Total N (%)	C/N	Total P (mg/kg)	Colwell P (mg/kg)	P retn. (%)	SO_4-S (mg/kg)	Water Stable Aggreg. (%)
	0–30	5.0	*4.89*	*0.29*	*17*	*219*	*6*	*22*	*3*	*n.d.*
A11	0–16	5.2	4.34	0.26	17	215	7	16	3	n.d.
A12	16–42	5.2	2.91	0.16	18	209	3	36	3	n.d.
B1	42–68	5.1	2.81	0.12	23	193	n.d.	52	5	n.d.
B2	68–92	5.0	2.29	0.08	30*	142	n.d.	60	11	n.d.
B3	92–110	5.0	1.48	0.05	31*	144	n.d.	50	17	n.d.

*These high C/N ratios are influenced by the charcoal in these two horizons.

Horizon	Depth (cm)	Exch. Ca (cmol(+)/kg)	Exch. Mg (cmol(+)/kg)	Exch. K (cmol(+)/kg)	Exch. Na (cmol(+)/kg)	CEC (cmol(+)/kg)	BS (%)
	0–30	*4.17*	*2.52*	*0.41*	*0.41*	*19.4*	*39*
A11	0–16	3.74	1.94	0.34	0.31	15.5	41
A12	16–42	1.53	1.34	0.38	0.24	15.8	22
B1	42–68	0.69	0.71	0.20	0.26	15.3	12
B2	68–92	0.49	0.26	0.04	0.17	14.8	6
B3	92–110	0.39	0.20	0.004	0.14	12.1	6

Analyses by Landcare Research New Zealand Ltd., 11 May 2005. Analytical methods were those of Blakemore et al. (1987) and Rayment and Higginson (1992).

References

Blakemore, L. C.; Searle, P. L. and Daly, B. K. 1987. Methods of chemical analysis of soils. *New Zealand Soil Bureau Scientific Report 80.*

Grant, J.; Laffan, M. and Hill, R. 1995. Soils of Tasmanian State Forests 2. Forester Sheet. Soils Bulletin 2. Forestry Tasmania, Hobart.

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Citation

McIntosh, P.D. and Laffan, M.D. 2005. Stronach soil. *Tasmanian forest soil fact sheet no. 34.* Forest Practices Board, Hobart and Forestry Tasmania, Hobart. 4 p.

30 June 2005