

# Lake soil – soil in colluvium from Permian fine sandstone and siltstone, 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 Permian fine sandstone and minor siltstone and mudstone

*Landform:* Midslopes in hilly and steep terrain

*Drainage Class:* Well drained or moderately well drained

*Vegetation:* Dry sclerophyll forest with *Eucalyptus amygdalina*, *Acacia dealbata*, *Pteridium esculentum*, *Coprosma quadrifida*



## Distinguishing Soil Properties

### Profile Features:

- Texture-contrast profiles with silty loam textures near surface becoming silty clay textures deeper in the profile
- A2 horizon not bleached, or bleaching not prominent
- Gravelly profiles with brown colours throughout
- Well drained or moderately well drained

### Chemical and physical features

- Low to medium total C and total N in topsoil (0-30 cm)
- Medium total P in topsoil (0-30 cm)
- Low  $\text{SO}_4\text{-S}$  throughout profile
- Moderate erodibility
- Permeability high; may be restricted in deep subsoil horizons



## 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
- Soil 12.1, Forest Soils of Tasmania – in tillite under wet forest
- O'Connor soil (Tasmanian forest soil fact sheet no. 7) – similar parent material, but soil is mottled and imperfectly drained

## Soil Degradation Potential

| FACTOR                          | RATING OF DEGRADATION POTENTIAL |
|---------------------------------|---------------------------------|
| <i>Erodibility:</i>             | Moderate                        |
| <i>Compaction and puddling:</i> | Low                             |
| <i>Mixing:</i>                  | Moderate                        |
| <i>Nutrient depletion:</i>      | Moderate                        |
| <i>Landslides:</i>              | Slight to Moderate              |
| <i>Flooding:</i>                | Negligible                      |

## Site Productivity

Low productivity because of low to moderate nutrient levels and low moisture availability

## Soil Management

Soils on steep slopes are prone to erosion following clearing. Harvesting and fire management should aim to keep topsoils intact in order to retain nutrients; topsoil mixing and very hot burns should be avoided.

## Native Forest Logging and Regeneration

### LOGGING AND CLEARING:

The nutrient levels in the soil are concentrated mainly in the thin surface horizon and are prone to loss by erosion. Compaction, rutting and mixing of the surface horizon by snig tracks should be minimised.

### 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, and long rotations.

## Suitability for Plantations

**Marginally suitable to unsuitable** for plantations on slopes up to 19° – limitations of moisture, nutrients and low productivity.

**CLEARING:** Care must be taken to retain the surface soils.

**CULTIVATION:** Contour-cultivation on all sloping land is recommended to prevent erosion.

**FERTILISER:** N, P and S fertiliser is required at planting; secondary fertilisation is likely to be required.

## Profile

*Authors:* P. D. McIntosh and C. Hawkins

*Date:* 30 October 2000

*Location:* Roadside cutting on north side of Millers Bluff Road, 400 m east of ford on Lake River.

*Map reference:* Sheet 5035 (Millers) 097 593

*Landform:* Midslope of hillside 50 m long, on side of spur

*Vegetation:* *Eucalyptus amygdalina*, *Acacia dealbata*, *Pteridium esculentum*, *Coprosma quadrifida*, grasses

*Parent material:* Colluvium from Permian fine sandstone and siltstone

*Drainage:* Moderately well drained

*Slope:* 12°

*Aspect:* Southwest

*Altitude:* 330 m

*Photographs:* 11-00(1)-10a (profile); 11-00(1)-13a (site)

*Australian Soil Classification:* **Haplic Magnesic Kurosol**

|     |          |   |
|-----|----------|---|
| A1  | 0-8 cm   | Very dark brown (10YR2/2) (moist) silty loam (20% clay estimate); weak strength; moderate 2-5 mm granular structure; abundant medium and coarse roots; NaF 0/5.   |
| A2  | 8-30 cm  | Very dark greyish brown (10YR4/2) (moist) silty loam (25% clay estimate); firm strength; moderate 10-20 mm blocky structure; 15% angular gravels 50 mm diameter; many medium roots; NaF 0/5.  |
| B2  | 30-59 cm | Yellowish brown (10YR5/4) (moist) silty clay (50% clay, 50% silt estimate); 5% yellowish brown mottles 5 mm diameter; 5% pale brown (10YR6/3) mottles 5 mm diameter; firm strength; strong 10-30 mm blocky structure; few medium roots; NaF 0/5.                          |
| Ab  | 59-64 cm | Brown (10YR5/3) (moist) silty clay; weak strength; strong 5 mm granular structure; weak 10-20 cm blocky structure; 40% subangular fine sandstone gravels 20 to 80 mm diameter; many medium roots; NaF 0/5. (Buried topsoil).  |
| B2b | 64-80 cm | Yellowish brown (10YR5/4) (moist) silty clay; 5% yellowish brown mottles 5 mm diameter; 5% pale brown (10YR6/3) mottles 5 mm diameter; firm strength; weak 40-60 mm blocky structure; 40% angular sandstone gravels 50 mm diameter; few medium and coarse roots; NaF 0/5. |
|     | on       | Jointed fine sandstone  |

## Laboratory Analyses

| Horizon | Depth (cm) | pH (H <sub>2</sub> O) | Total C (%) | Total N (%) | C/N | Total P (mg/kg) | P retn. (%) | SO <sub>4</sub> -S (mg/kg) | Water-stable aggreg. (%) |
|---------|------------|-----------------------|-------------|-------------|-----|-----------------|-------------|----------------------------|--------------------------|
| A1      | 0-8        | 5.86                  | 5.78        | 0.29        | 20  | 152             | 15          | 2                          | 63                       |
| A2      | 8-30       | 5.15                  | 0.68        | 0.03        | 23  | 96              | 22          | 2                          | 68                       |
| B2      | 30-59      | 5.19                  | 0.38        | 0.03        | 13  | 74              | 44          | 1                          | 69                       |
| Ab      | 59-64      | 5.13                  | 0.85        | 0.05        | 17  | n.d.            | n.d.        | n.d.                       | n.d.                     |
| B2b     | 64-80      | 5.17                  | 0.45        | 0.03        | 15  | 75              | 35          | 1                          | 68                       |

| Horizon | Depth (cm) | Exch. Ca (cmol(+)/kg) | Exch. Mg (cmol(+)/kg) | Exch. K (cmol(+)/kg) | Exch. Na (cmol(+)/kg) | CEC (cmol(+)/kg) | BS (%) |
|---------|------------|-----------------------|-----------------------|----------------------|-----------------------|------------------|--------|
| A1      | 0-8        | 10.86                 | 5.05                  | 0.94                 | 0.23                  | 22.8             | 75     |
| A2      | 8-30       | 0.42                  | 1.66                  | 0.32                 | 0.25                  | 10.3             | 26     |
| B2      | 30-59      | 0.60                  | 10.19                 | 0.49                 | 0.58                  | 28.3             | 42     |
| Ab      | 59-64      | n.d.                  | n.d.                  | n.d.                 | n.d.                  | n.d.             | n.d.   |
| B2b     | 64-80      | 0.04                  | 7.63                  | 0.33                 | 0.43                  | 21.3             | 40     |

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  $\text{SO}_4\text{-S}$  (details available from P. D. McIntosh, Forest Practices Board).

## 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*.
- Laffan, M. D.; Grant, J and Hill, R. 1996. A method for assessing the erodibility of Tasmanian forest soils. *Australian Journal of Soil and Water Conservation* 9: 16 – 22.
- Rayment, G. E, and Higginson, F. R. 1992. Australian Laboratory Handbook of Soil and Water Chemical Methods. Incarta Press, Melbourne. 330p.

## Acknowledgements

To Gunns Ltd, for funding soil analyses.

## Citation:

McIntosh, P.D. and Hawkins, C. 2001. Lake soil. *Tasmanian forest soil fact sheet no. 8*. Forest Practices Board, Hobart and Gunns Ltd, Launceston. 4 p.

2 August 2001

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