



Landscape—rolling to steep sideslopes on Wianamatta Group shales and shale colluvium. Local relief 40–100 m, slopes >20%. Partially cleared, tall, open-forest (wet sclerophyll).

Soils—deep (>200 cm) Red and Brown Podzolic Soils (Dr2.11, Dr3.11, Db1.11) on upper and midslopes; Yellow and Brown Podzolic Soils (My 4.11, Dy5.11, Db1.11) on colluvial benches; Yellow Podzolic Soils (Dy3.11) and Gleyed Podzolic Soils (Dg4.11) in drainage lines and poorly drained areas.

Limitations—mass movement hazard, steep slopes, high soil erosion hazard, localised seasonal waterlogging, impermeable plastic shrink-swell subsoil.

LOCATION

West Pennant Hills soil landscape occurs as steep, narrow, generally south-west facing, hill slopes on the Hornsby Plateau. Examples occur along the Pacific Highway ridge at Gore Hill, Turramurra, Pymble, Wahroonga, Waitara, and to the west of Castle Hill Road at West Pennant Hills and Baulkham Hills. It also occurs at Eastwood, Denistone, Glenhaven and Carlingford.

LANDSCAPE

Geology

Wianamatta Group. Ashfield Shale formation-laminite and dark grey shale. Bringelly Shale-shale, calcareous claystone, laminite, fine to medium grained lithic quartz sandstone (Herbert, 1983).

Topography

Steep sideslopes with mass movement derived landforms. Local relief is 40–100 m with slopes generally >20% and ranging up to 40%. Steep slopes with colluvial benches with southerly and

south-westerly aspects are dominant landform elements. Mass movement processes, predominantly soil creep, earthflow and slumping and tension cracks may be evident (Hird and Quilty, 1977). Perched watertables are often associated with colluvial deposits.

Vegetation

Extensively cleared tall open-forest (wet sclerophyll forest). Dominant tree species include Sydney blue gum *Eucalyptus saligna* and blackbutt *E. pilularis*. Other species include turpentine *Syncarpia glomulifera*, grey ironbark *E. paniculata* and white stringybark *E. globoidea*. Understorey shrubs include pittosporum *Pittosporum undulatum* and blackthorn *Bursaria spinosa*. The Dalrymple Hay Reserve at St Ives contains undisturbed native vegetation.

Landuse

Cleared open spaces, parks and reserves are the most common land use. High density residential development occurs at Gore Hill. Low density and strategic residential development occurs at West Pennant Hills and Pymble. The Forestry Commission manages Cumberland State Forest. Horses are grazed at West Pennant Hills.

Associated Soil Landscapes

Glenorie (gn) soil landscape is often adjacent and contains similar soil materials. Glenorie soil landscape is less steep, and is not subject to mass movement.

SOILS

Dominant Soil Materials

wpl—Friable, dark brown clay loam. This is a friable loam to silty clay loam with strongly pedal sub-angular blocky structure. It generally occurs as topsoil (A1 horizon).

The peds are commonly rough-faced and porous, ranging- in size between 2 mm and 10 mm. They break down readily into fine crumbs. The surface condition is usually friable. Colour is generally dark brown (10YR 3/7, 5YR 3/3) but may range from very dark brown (7.5YR 2/2) to a dark yellowish-brown (10YR 4/4). The pH can range from moderately acid (pH 5.0) to slightly acid (pH 6.0). Weakly weathered shale and brown, platy, iron coated fine sandstone rock fragments are often present.

Charcoal fragments are occasionally present and roots are common.

wp2—Whole-coloured, strongly pedal clay. This is a whole-coloured, silty to heavy clay with strongly pedal, sub-angular blocky structure. It often occurs as subsoil (B horizon).

Peds are commonly smooth-faced and dense, ranging in size between 10 mm and 20 mm. The colour ranges from reddishbrown (5YR 4/6-2.5YR 4/8) to dull yellowish brown (10YR 5/4). Although not common, red and grey mottles may occur at the base of this material. The pH ranges from extremely acid (pH 4.0) to slightly acid (pH 6.5). Weakly weathered shale and iron coated rock fragments are present and charcoal fragments and roots are rare.

wp3—Mottled, light grey, highly plastic clay. This is a red and yellow mottled highly plastic, medium to heavy clay with strongly pedal, sub-angular blocky structure. It generally occurs as deep subsoil (B horizon).

Peds are commonly smooth-faced and dense and range in size between 10 mm and 20 mm. The colour is usually light brownish grey (5YR 7/ 1), but can range from light reddish grey (2.5YR 7/1) to brownish grey (7.5YR 6/1). Yellow and red mottles are commonly present. The pH ranges from extremely acid (pH 4.0) to very strongly acid (pH 5.0). Strongly weathered shale and iron coated

fine sandstone rock fragments are common to abundant. Charcoal fragments are absent and roots are rare.

Occurrence and Relationships

Upper slopes and midslopes. Up to 50 cm of friable, dark brown clay loam (**wp1**) overlies >100 cm of whole-coloured, strongly pedal, brown clay (**wp2**). Bleached A2 horizons are rare. Up to several metres of mottled grey, highly plastic clay (**wp3**) and weathered shale occurs at depth. Occasionally the **wp1** soil material is absent. Boundaries between soil materials are usually clear to gradual. Total soil depth is commonly >200 cm [Red Podzolic Soils (Dr2.11, 2.21), Brown Podzolic Soils (Db 1.11, Db1.21)).

Colluvial shale benches. Soils on colluvial benches are highly variable over short distances. Stones are dispersed and reoriented rather than stratified as in most Wianamatta shale soils.

Up to 80 cm of **wp1** overlies >100 cm of **wp2**, which is sometimes mottled. **wp2** overlies up to several metres of **wp3**. Boundaries between soil materials are clear. Total soil depth is >200 cm [Brown Podzolic Soils (Db1.11), Yellow Podzolic Soils (Dy 4.11, Dy 5.11)].

Footslopes, drainage lines. Up to 60 cm of **wp1** overlies >200 cm of **wp3** and deeply weathered shale [Yellow Podzolic Soil (Dy3.11), Gleyed Podzolic Soils (Dg4.11)].

LIMITATIONS TO DEVELOPMENT

Urban Capability

Generally not capable of urban development.

Rural Capability

Generally not capable of being cultivated or grazed. Small areas with slopes <20% are suitable for grazing.

Landscape Limitations

Mass movement hazard
Steep slopes
Seasonal waterlogging (localised)
Erosion hazard
Run-on (localised)
Moderate to highly reactive soils

Soil Limitations

wp1 Low wet strength

wp2 Low wet strength
Low permeability (localised)
Strongly acid
High aluminium toxicity

wp3 Low wet strength
Slump prone
Low permeability
Low available water capacity (localised)
Stoniness
Low fertility
Very strongly acid

High shrink swell (localised)
Very high aluminium toxicity

Fertility

The general fertility is moderate. The topsoil (**wp1**) has high organic matter content, high to moderate CEC and moderate amounts of nitrogen. The other soil materials have low fertility with low to moderate nitrogen and low phosphorus levels and moderate to very high potential aluminium toxicity.

Erodibility

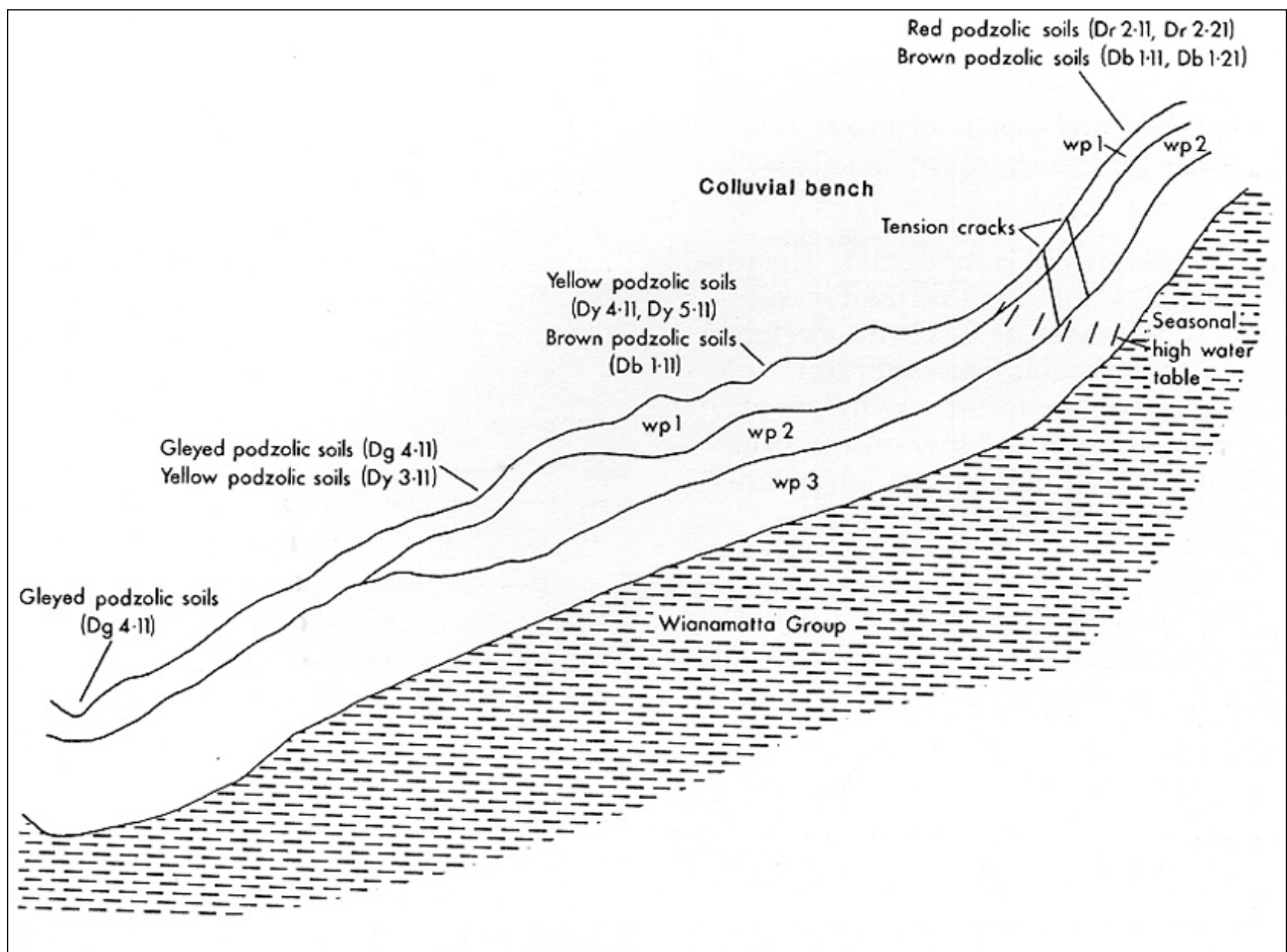
The West Pennant Hills soil materials have low soil erodibility as they are composed of relatively stable soil aggregates.

Erosion Hazard

Because slopes are steep the erosion hazard for non-concentrated flows is high to extreme. Calculated soil loss for the first twelve months of urban development ranges up to 219 t/ha of topsoil and 372 t/ha for exposed subsoil. The erosion hazard for concentrated flows is very high to extreme.

Surface Movement Potential

Moderately reactive. Deep clayey expansive soils occur on a landscape with complex drainage conditions and areas of tall trees. Isolated areas of highly reactive soils occur.



Schematic cross-section of West Pennant Hills soil landscape illustrating the occurrence and relationship of the dominant soil materials.