



Source: Soil and Land Resources of the Hawkesbury-Nepean Catchment *interactive DVD*

Landscape—undulating to rolling low hills on Wianamatta Group shales. Local relief 50–80 m, slopes 5–20%. Narrow ridges, hillcrests and valleys. Extensively cleared tall open-forest (wet sclerophyll forests).

Soils—shallow to moderately deep (<100 cm) Red Podzolic Soils (Dr2.11) on crests; moderately deep (70–150 cm) Red and Brown Podzolic Soils (Dr2.11, Dr2.21, Db1.11, Db1.21) on upper slopes; deep (>200 cm) Yellow Podzolic Soils (Dy5.11) and Gleyed Podzolic Soils (Dg4.11) along drainage lines.

Limitations—high soil erosion hazard, localised impermeable highly plastic soil, moderately reactive.

LOCATION

Glenorie soil landscape occurs north of the Parramatta River on the Hornsby Plateau in Baulkham Hills, Hornsby, Ku-ring-gai, and Ryde local government areas. Smaller isolated areas are at Condell Park, Hurstville, and on the Cumberland Lowlands at Rosehill.

LANDSCAPE

Geology

This soil landscape is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations.

The Ashfield Shale is comprised of laminite and dark grey shale. Bringelly Shale consists of shale, calcareous claystone, laminite, fine to medium grained lithic-quartz sandstone (Herbert, 1983).

Topography

Low rolling and steep hills. Local relief 50–120 m, slopes 5–20%. Convex narrow (20–300 m) ridges and hillcrests grade into moderately inclined sideslopes with narrow concave drainage lines. Moderately inclined slopes of 10–15% are the dominant landform elements.

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*, white stringybark *E. globoidea* and rough-barked apple *Angophora floribunda*. *Pittosporum undulatum* and coffee bush *Breynia oblongifolia* are common understorey species (Benson, 1980). Most original vegetation has been extensively cleared, except for larger trees in many residential areas. Examples of original vegetation can be seen in parts of Dalrymple Hay Reserve at St Ives and in Blackwood Memorial Sanctuary at Beecroft.

Land use

Land is used for urban residential sites over much of this soil landscape (Turramurra, Carlingford). Rural land uses, mostly hobby farms and small rural subdivisions, occur at Glenorie, Dural and Castle Hill. These include equestrian activities, orchards, cut flower production and market gardens (Galston, Arcadia) and timber production (Cumberland State Forest).

Existing Erosion

Minor gully erosion is evident along unpaved roads. Moderate sheet erosion occurs on disturbed areas (e.g., cultivated lands). Small areas of moderate to severe sheet erosion occur in overgrazed paddocks on many hobby farms. Evidence of previous erosion is commonplace, especially where eroded topsoil has been deposited against fences.

SOILS

Dominant Soil Materials

gn1—Friable dark brown loam. This is generally a dark brown, friable loam, silt loam or silty clay loam with moderately to strongly pedal structure and porous rough-faced ped fabric. This material occurs as topsoil (A1 horizon).

Peds are commonly sub-angular blocky to polyhedral, 2–10 mm in size and are rough faced and porous. In uncompacted soils these peds break down readily to very small crumbs. Surface condition is distinctly friable but may become hardsetting when compacted and dry. Colour is generally dark brown (10YR 3/3, 7.5YR 3/3) and may range from brownish-black (7.5YR 2/2) to brown (10YR 4/4). This material is occasionally water repellent. The pH ranges from moderately acid (pH 5.0) to slightly acid (pH 6.0). Shale fragments occur and charcoal is occasionally present whilst roots are common.

gn2—Hardsetting brown clay loam. This is commonly a clay loam to fine sandy clay loam with an apedal massive or weakly pedal structure and an earthy or porous, rough-faced ped fabric. This material occurs as an A2 horizon and is occasionally hardsetting when exposed at the surface.

Peds, when present, are sub-angular blocky, 10–50 mm in size, and are rough faced and porous. Otherwise this material has apedal massive structure with an earthy porous fabric. Colour is commonly brown (7.5YR 4/4) but may range between dull yellowish-brown (10YR 5/4) and

reddish-brown (5YR 4/6). The pH ranges between strongly acid (pH 4.0) and moderately acid (pH 6.0). Shale rock fragments, charcoal fragments and roots are present.

gn3—Whole-coloured, reddish-brown, strongly pedal clay. This is medium clay with strongly pedal structure and smooth-faced, dense, ped fabric. It generally occurs as subsoil (B horizon).

Texture is generally medium clay but may range from silty clay to heavy clay. The peds are usually sub-angular blocky or polyhedral. They range in size from 5–20 mm and are smooth-faced and porous. Cutans are also present. Colour is generally reddish-brown (5YR 4/6-8) and can range from bright reddish-brown (2.5YR 4/8) to dull yellowish-brown (10YR 5/4). The pH ranges from strongly acid (pH 4.0) to moderately acid (pH 5.5). Shale rock fragments are common. Roots are rare and charcoal fragments are absent.

gn4—Mottled grey plastic clay. This is a grey, mottled, medium to heavy clay with strongly pedal structure and dense, smooth ped fabric. It commonly occurs as deep subsoil.

The peds are usually sub-angular blocky, 10–20 mm in size, and are smooth-faced and dense. These can be broken down easily to smaller (2–5 mm) polyhedral peds. Colour is usually pale grey (5YR 7/1), but ranges from light reddish-grey (2.5YR 7/1) to brownish-grey (7.5YR 6/1). Yellow and red mottles are common. It is usually moist and is very plastic. The pH ranges from strongly acid (pH 4.0) to moderately acid (pH 5.0). Shale rock fragments and gravels are common. Roots are rare and charcoal is absent.

gn5—Brownish-grey plastic silty clay. This is commonly brownish-grey, plastic silty clay which is often saturated and exhibits apedal massive structure. It usually occurs as subsoil (B horizon).

Colour is dark brown (10YR 3/3) often becoming brownish-grey (10YR 4/1) with dark brown mottles at depth. This material is moderately sticky and very plastic when moist. The pH ranges from moderately acid (pH 5.0) to slightly acid (pH 6.5). Rock and charcoal fragments are absent and roots are rare.

Associated soil materials

Lateritic ironstone concretions. Red, concretionary, ironstone nodules are often found in the deep subsoil and are closely associated with **gn4** soil material.

Occurrence and Relationships

Crests. Up to 15 cm of friable, dark brown loam (**gn1**) overlies 10–30 cm of hardsetting, brown clay loam (**gn2**) and 30–100 cm of whole-coloured reddish-brown, strongly pedal clay (**gn3**). Occasionally **gn1** is absent. Boundaries between soil materials are usually clear. Total soil depth is commonly <150 cm [Red Podzolic Soils (Dr 2.11)].

Upper slopes and midslopes. Up to 15 cm of **gn1** overlies 5–30 cm of **gn2** and >100 cm of **gn3**. **gn3** usually overlies up to 150 cm of mottled grey, plastic, strongly structured clay (**gn4**). Occasionally the **gn1** soil material is absent. Boundaries between soil materials are usually clear. Total soil depth is 50–>100 cm [Red Podzolic Soils (Dr2.11, 2.21), Brown Podzolic Soils (Db 1.11,1.21)].

Lower slopes. Generally 10–60 cm of **gn1** overlies 100 cm of **gn3** and 20–100 cm of **gn4**. Boundaries between soil materials are usually clear. Total soil depth is >150 cm [Yellow Podzolic Soils (Dy 4.11, Dy 5.11)].

Drainage lines. Up to 100 cm of brownish-grey, plastic, silty clay (**gn5**) overlies >100 cm of **gn4**. [Humic Gleys (Uf6.6)]. Many drainage lines contain up to 100 cm of recently transported topsoil **gn1** overlying **gn4** [Gleyed Podzolic Soils (Dg4.11) and occasionally **gn3** (Yellow Podzolic Soils (Dy5.11))].

In some forested areas soils may be gradational. These soils are typically covered with up to 20 cm of forest litter [Prairie Soils (Gn 3.21)].

Occasionally ironstone concretionary nodules associated with laterite occur above and within **gn4** at depth [Red Lateritic Podzolic Soils (KS–Dr3.21)].

LIMITATIONS TO DEVELOPMENT

Urban Capability

Generally, a low to moderate capability for urban development.

Rural Capability

Land generally capable of being grazed and regularly cultivated.

Landscape Limitations

Erosion hazard

Seasonal waterlogging (localised)

Moderate surface swelling potential

Soil Limitations

gn1 Low wet strength
Very strongly acid
High aluminium toxicity

gn2 Low wet strength
Stoniness (localised)
Low fertility
Strongly acid
High aluminium toxicity

gn3 Low wet strength
Low permeability (localised)
Low available water capacity
Stoniness (localised)
Salinity (localised)
Sodicity (localised)
Low fertility
Very strongly acid
Very high aluminium toxicity
High shrink-swell (localised)

gn4 Low wet strength
Low permeability
Low available water capacity
Stoniness
Strongly acid
Very high aluminium toxicity
Low fertility (localised)
Shrink-swell (localised)

gn5 Low wet strength
Low permeability
Low available water capacity

Salinity (localised)
Sodicity (localised)
High shrink-swell (localised)

Fertility

The general fertility is low to moderate. The topsoil (**gn1**) has moderate fertility with high available water capacity, moderate amounts of organic matter, and moderate nutrient status. **gn2** normally has low to moderate fertility with moderate available water capacity, high organic matter content, low CEC, and intrinsically low to moderate nutrient status. All the other soil materials have low fertility with moderate available water capacities, low to moderate CEC and generally low to moderate nitrogen and phosphorus levels (**gn3–gn5**). All soil materials are acid and are potentially aluminium toxic.

Erodibility

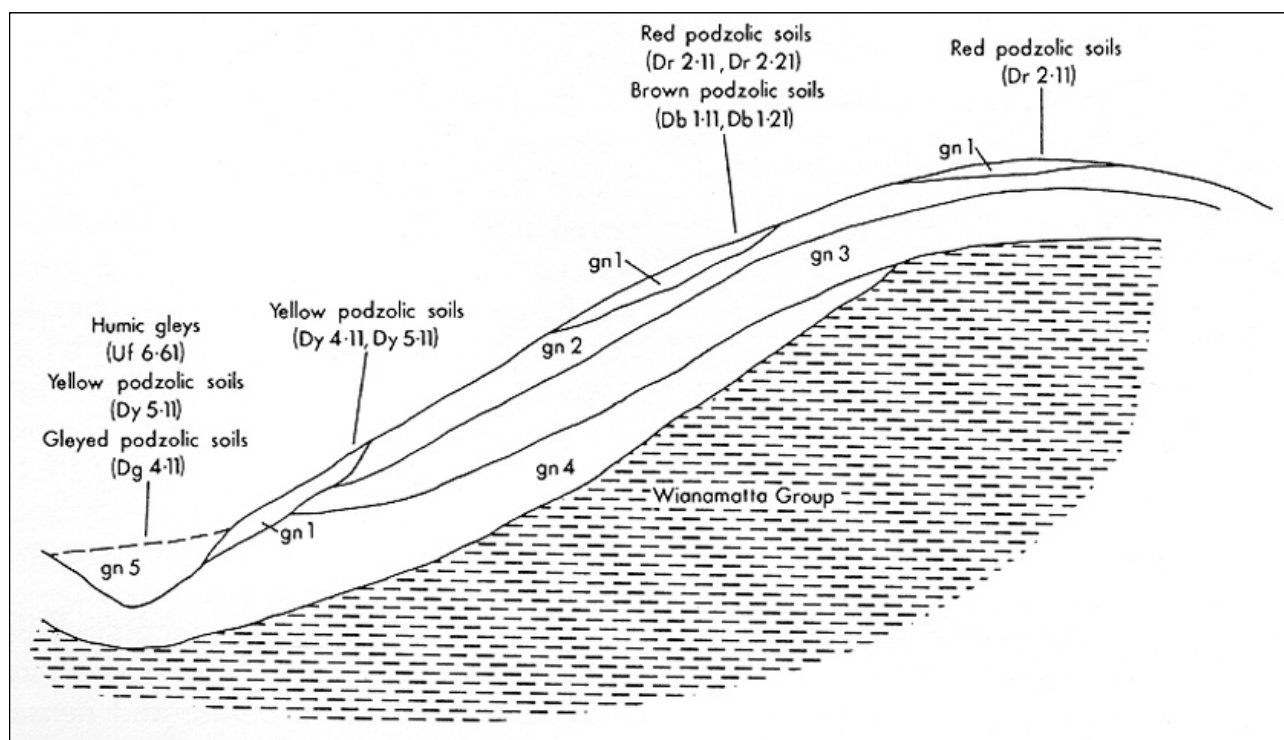
gn1 and **gn2** have low erodibility as they are generally high in organic matter have stable aggregates and are well graded. All the other soil materials are moderately erodible as they are finely graded and have relatively stable aggregates. **gn3–gn5** clays may be locally dispersible and should be considered highly erodible.

Erosion Hazard

The erosion hazard for non-concentrated flows ranges from moderate to very high. Calculated soil loss for the first twelve months of urban development ranges up to 65 t/ha for topsoil and 117 t/ha for exposed subsoil. The soil erosion hazard for concentrated flows is high.

Surface Movement Potential

Moderately reactive soil materials. Soils are deep and have high clay content. Clay often has low to moderate volume expansion. Tall trees are common on this landscape.



Schematic cross-section of Glenorie soil landscape illustrating the occurrence and relationship of the dominant soil materials.