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BLACK ROCK



Landscape—extremely low level to gently undulating beach ridge plains on Pleistocene beaches and dune sand. Elevation and relief are 1–2 m, slopes <5%. The topography is characterised by dune/swale systems aligned parallel to the coast. Dunes are very low (<3 m) and narrow to moderately broad (20–500 m), swales narrow to moderately broad (100–500 m). Dry and wet heathland occurs in dunes and swales respectively.

Landscape Variant—bra—extensive sand sheet (possibly Holocene) supporting low heath and shrubland.

Soils—deep (>300 cm), well-drained Podzols (Uc2.3, Uc5) on dunes. Deep (>300 cm), imperfectly drained Humus Podzols and Peaty Podzols (Uc2.3, Uc5) in depressions and deep (>200 cm), waterlogged Acid Peats (O) in swales. Deep (>300 cm), rapidly drained Siliceous Sands (Uc1.21, Uc1.22) on newer, seaward dunes.

Limitations—non-cohesive, highly permeable, highly acid soils of very low fertility. Organic soils in swales with permanently high watertables. High wind erosion hazard.

LOCATION

Pleistocene beach ridge plains on the Tweed-Byron Coast, north of Lennox Head and north of Byron Bay. Type location is traversed by the coast road between Lennox Head and Broken Head (Area reference 5 57***E, 68 17***N).

LANDSCAPE

Geology

Quaternary (Pleistocene) beach and dune sand.

Topography

Extremely low, level to gently undulating beach ridge plains. Elevation is generally 1–2 m, though can be 4–9 m on some higher dunes which have been modified by mining and/or Holocene transgressive material. Slopes range from 0–5% and relief is 1–2 m. The topography is characterised by dune/swale systems aligned parallel to the coast and associated sand sheets. Swales can be linearly discontinuous and narrow to moderately broad (100–500 m). Dunes are low (up to 3 m) and narrow to moderately broad (20–500 m). The dune/swale pattern is pronounced on aerial photography or satellite imagery. Wave erosion of Holocene sand deposits has left a sand scarp several metres high at the rear of the beach in places (e.g., north end of Seven Mile Beach). This is often underlain by exposed coffee rock.

Vegetation

Partially cleared low to tall dry heathland on dunes and partially cleared low wet heathland and tall open and sparse wet heath in swales and depressions. Common species of wet heathland include broad-leaved paperbark (*Melaleuca quinquenervia*), coast wattle (*Acacia longifolia* var. *sophorae*), wallum bottlebrush (*Callistemon pachyphyllus*), common tea-tree (*Leptospermum flavescens*), prickly tea-tree (*Leptospermum juniperinum*) and wedding bush (*Ricinocarpus pinifolius*). Scrambling fern (*Lygodium scandens*) is a very common scrambler.

Ground level wet heath species include tall saw sedge (*Gahnia clarkei*), saw sedge (*Gahnia melanocarpa*), giant sedge (*Lepironia articulata*), common reed (*Phragmites australis*), sedge (*Cyperus* spp.), coral fern (*Gleichenia dicarpa*) and common rush (*Juncus usitatus*).

Common dry heathland species (see East Ballina soil landscape) include stunted pink bloodwood (*Eucalyptus intermedia*), horsetail oak (*Casuarina equisetifolia*), hairpin banksia (*Banksia collina*), heath banksia (*Banksia ericifolia*) and common tea-tree (*Leptospermum flavescens*).

Large communities of common reed (*Phragmites australis*) may occur within swales. Bitou bush (*Chrysanthemoides monilifera*) is a prolific exotic.

Land Use

Generally uncleared heath. In the recent past much of this soil landscape has been exploited for mineral sands, particularly along swales where artificial ponds may be present.

Existing Land Degradation

There is very little erosion within this soil landscape. The land surface is flat and vegetative cover is good. Where there has been disturbance generally in mined areas, high water tables can create ponding. When exposed, this soil landscape may be rapidly degraded by severe wave and wind erosion.

Landscape Variant

The area mapped as **bra** is an extensive sand sheet, possibly consisting of Holocene wind-blown sand. This variant supports a low heath shrub.

SOILS

Dominant Soil Materials

The soil materials are similar to Wardell (**wa**) and some type locations are shared.

br1—Black loamy sand (topsoil—A₁ horizon)

Colour	brownish black (10YR 3/1) to black (10YR 1.7/1, 2.5Y 2/1)
Texture	organic loamy sand, often fibric
Structure	single-grained
Fabric	sandy
Exposed condition	loose, water repellent when dry
Permeability	high
pH	4.0–5.0
Coarse fragments	none
Roots	abundant, <1 mm; common, 2–5 mm
Type location	beside road just west of fork (Grid Ref. 5 56900E, 68 18900N) Soil Data System card 11, 0–25 cm

br2—Bleached sand (bleached A₂ horizon)

Colour	light grey (2.5Y 7/1, 10Y 8/1) to brownish grey (5YR 5/1, 7.5YR 6/1)
Texture	coarse sand
Structure	single-grained
Fabric	sandy
Exposed condition	loose
Permeability	high
pH	5.0–6.0
Coarse fragments	none
Type location	beside road just west of fork (Grid Ref. 5 56900E, 68 18900N) Soil Data System card 11, 25–100 cm

br3—Black organic peat (P horizon)

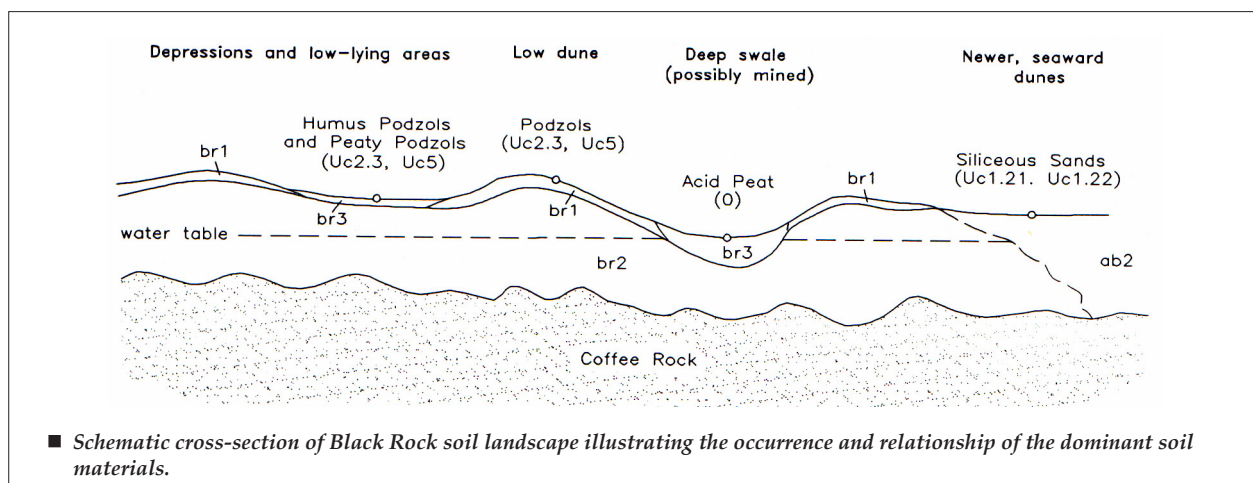
Colour	brownish black (10YR 2/2) to reddish black (7.5R 1.7/1) with depth
Texture	fibric, spongy loam to light clay, usually too wet to accurately field texture
Structure	massive
Fabric	earthy
Exposed condition	fibrous, very light bulk density, ignitable when dry. Spongy when wet
Permeability	slow
pH	4.5–5.5
Coarse fragments	none
Roots	abundant, 1–2 mm forming a dense network. Common, 2–5 mm
Type location	swale to north of Grays Lane (Grid Ref. 5 55750E, 68 35400N). Soil Data System card 389, 0–50 cm

Associated Soil Materials

Strongly cemented brown organic pan (coffee rock). This is composed of sand grains cemented by organic matter. Generally it occurs well below 1–2 m. In places it is exposed on beaches and appears to be a black rock.

Angels Beach soil materials occur on seaward margins.

ab2—Loose brownish grey quartz sand



Occurrence and Relationships

The soils of the Black Rock soil landscape are easily predicted by landform element and consist of Podzols, Humus Podzols and Acid Peats.

Soils on low ridges and sand sheets. Up to 30 cm of black loamy sand (**br1**) overlies very deep (1 000–5 000 cm) layers of bleached sand (**br2**). This layer is usually underlain by coffee rock. Boundaries are usually gradual but may be clear [well-drained Podzols (Uc2.3, Uc5)]. Total soil depth is >300 cm.

Deep swales. Up to and more than 1 500 cm of black organic peat (**br3**) occupies swales [very poorly drained Acid Peats (0)]. Total soil depth is >300 cm.

Depressions and low-lying areas. Up to 30 cm **br3** overlies very deep (>200 cm) layers of **br2**. This layer is immediately underlain by coffee rock near the watertable. Boundaries are clear and wavy [imperfectly drained Humus Podzols and Peaty Podzols (Uc2.3, Uc5)]. Total soil depth is >300 cm.

Near Holocene dunes. **ab2** is the dominant soil material [rapidly drained Siliceous Sands (Uc1.21, Uc1.22)]. Coffee rock occurs at depth (>500 cm) and there has been much mixing of Holocene and Pleistocene sands. Total soil depth is >300 cm.

LIMITATIONS TO DEVELOPMENT

Soil Limitations

- br1** High erodibility (wind)
High permeability
Low fertility
Very low available water-holding capacity
Strongly acid
- br2** Very high erodibility (wind)
Very high permeability
Very low fertility
Low available water-holding capacity
Strongly acid
- br3** Low wet bearing strength
Organic soil
Low permeability
Strongly acid
Extreme salinity (localised)

Erodibility

	K factor	Non-concentrated flows	Concentrated flows	Wind
br1	0.000	very low	high	high
br2	0.004	very low	very high	high
br3	Peaty	very low	low-mod	low

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
grazing	slight	slight	high
cultivation	slight	slight	extreme
urban	slight	slight	extreme

Fertility

Soil Materials as Growth Media. Very low suitability (**br1**, **br2**, **br3**). Topsoils **br1** and **br2** have very low water-holding capacities, very low CEC, and very low phosphorus. Organic matter is moderate in **br1** but very low in **br2**. **br1** and **br2** are strongly acid. Topsoil/subsoil **br3** has very high CEC and organic matter but is strongly acid and can be saline.

Soil Profile Fertility. Low for Podzols, Humus Podzols, Peaty Podzols and Acid Peats. Soil volumes available for root penetration are generally limited by high watertables.

Foundation Hazard

Generally moderate but high within swales where high organic matter and waterlogged soils contribute to low wet bearing strength and unpredictable stability. Peats are susceptible to ignition when dry and will shrink when drained. Topsoil depth is 20–30 cm. Total soil depth is >300 cm.

Landscape Limitations

Permanently high watertables
Wind erosion hazard (moderate)
Non-cohesive soils

Urban Capability

Generally high limitations for urban development. Foundation hazard is moderate to high. On the seaward edge of the Black Rock soil landscape, blowouts and/or transgressive dunes of Holocene sand may be deposited, causing problems with any roads or buildings. Where the Pleistocene soil materials of the Black Rock soil landscape are exposed on beaches, they are prone to wave erosion.

Rural Capability

Generally extreme (on swales and poorly drained areas) to high (on dunes) limitations for cultivation. Soils have very low fertility and poor trafficability.

Generally moderate to high limitations for grazing. Soils are highly erodible and infertile.

Sustainable Land Use Suggestions

Septic disposal systems are not recommended due to extremely permeable soils with very low CEC and permanently high watertables. Peat fires are extremely damaging and difficult to contain—due care should be exercised when burning is carried out in or near peaty locations.