SOIL LANDSCAPES OF THE PACIFIC HIGHWAY CORRIDOR HEXHAM TO CORINDI

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LAND & WATER CONSERVATION

NIL - LP, GP, GR (low flat terrain)
LOW - RP, UP, UR, UL, UH (cuts not required over low slopes despite relief)
MODERATE - RL, RR, SR and B(<9m)
HIGH - B(>9m), SL, VL, all H>10% and M>10%
due mainly to relief requiring large cut and fill

FLOODING HAZARD - All swamps and most alluvial soil landscapes have a flooding hazard. The most damaging floods are relatively large floods with moderate return frequencies. Classes are:

NIL - No risk of flooding, most elevated land, most erosional, colluvial and dune landscapes
LOW - Isolated drainage depressions within the landscape may be inundated during short duration storm events. These would normally be catered for in culvert design.
MODERATE - Land does not flood regularly but may be inundated during large flood events, (high levees etc) (approx 1:100 years)
HIGH - Low lying land subject to frequent inundation (swamps etc), or inundation in a moderate flood event (floodplains) (1:20 years)

WATER EROSION HAZARD - This is the succeptibility of a parcel of land to erosion if the soil is left exposed and no eroson control management is employed. It is a function of the intrinsic attributes of the land contributing to potential soil loss including rainfall erosivity, soil erodibility and slope angle. It is independent of cover and soil management practices. As such it can be used to determine the relative risk of erosion of a soil landscape, should it be disturbed, when compared with other soil landscapes.

WATERLOGGING - Waterlogging can occur in a number of environments. It can be seasonal or permanent.

Wetness and Run-on. Transferal landscapes (footslopes and drainage plains) are subject to greater amounts of run-on and are therefore wetter

Seasonal Waterlogging. occurs in swamp landscapes. Swamps also have organic soils with low bearing strength

LOW BEARING STRENGTH SOILS - These consist of USCS Class CL, deep silts which can be saturated ie levee and lavee toes with alluvial silts, deep plastic clays, soils with high shrink swell and organic soils

LANDSCAPES SUBJECT TO MASS MOVEMENT - Includes known geological formations, plastic clays on steep slopes and footslopes, steep collluvial landscapees (This limitation is not intended to be site specific with respect to the risk of road batter collapse)

ACID SULFATE SOIL - Higher risks are associated with road construction than for agriculture. ASS may be within 3 m it may influence foundations. From ASS maps:

NIL - Other
LOW - Low risk >3 m
MODERATE - High Risk >3m
HIGH - all other classes

EXCAVATION DIFFICULTY - This is related to soil/regolith depth and strength of bedrock. Little difficulty would be expected with residual, alluvial, aeolian and transferral soil landscapes due to the depth of unconsolidated material and relatively low slopes. Moderate difficulty is expected erosional landscapes on soft rocks such as shale, phyllite etc and high difficulty is anticipated with hard rocks such as granites, basalt, sandstone, hornfels, etc. Classes are:

NIL - no excavation would be required (Flat terrain)
LOW - deep weathered clays (>3 m) over soft bedrock or unconsolidated sediments
MODERATE - Soils >1 m over soft bedrock (shales / phyllites)
HIGH - Soils of variable depth but overlying competent bedrock (granite, basalt etc)

1.2 PHYSICAL LIMITATIONS FOR FARMING

Each soil landscape has been rated into one of the following limitation categories:

LOW - High quality agricultural land with only minor limitations identified which can be readily overcome with sound farming practice Land would be generally capable of cultivation of a range of crops.

MODERATE - Moderate degree of limitation identified which may limit the range of farming activities or require specialised management techniques. Land would not be capable of cultivation but would be capable of grazing.

HIGH - High degree of limitation to sustainable agricultural land use.

SEVERE - Land with severe limitations not suited for agriculture, best retained under native vegetation.

Each soil landscape has been subscripted if any of the following limitations apply to a moderate or high extent. The combination of type and degree of limitation is used to give an overall limitation class. The following limitation criteria were considered:

RUGGED TERRAIN	**R**
FLOODING HAZARD	**F**
WATER EROSION HAZARD	**Ea**
WIND EROSION HAZARD	**Ei**
WATERLOGGING	**W**
MASS MOVEMENT HAZARD	**M**
ACID SULFATE SOILS	**A**
PHYSICAL PLANT GROWTH HAZARD	**Pp**
CHEMICAL PLANT GROWTH HAZARD	**Pc**
SOIL WORKABILITY HAZARD	**K**
SOIL SALINITY	**S**

2.1 SOIL LANDSCAPES OF THE COFFS HARDOUR - DORRIGO 1:100 000 SHEETS

bc *BARCOONGERE*

Landscape—undulating rises to low hills on late Carboniferous metasediments below the Coast Range in the far north-east of the region. Slope from 0 - 10%; local relief 10 - 30 m; elevation 10 - 40 m. Partially cleared, tall open-forest.

Soils—deep (>200 cm), moderately well-drained to well-drained structured Red Earths/Krasnozems (Gn3.11; Gn3.14) and Red Podzolic Soils (Dr2.31).

Qualities and Limitations—soils with low subsoil fertility, high deep subsoil erodibility, hardsetting surfaces (localised), strong acidity (localised) and aluminium toxicity potential (localised). Seasonal waterlogging (localised) and water erosion hazard (localised).

bd *BUNDAGEN*

Landscape—stable, gently undulating Holocene barrier sand sheets and low beach ridges. Local relief <2 m; slopes <10%; elevation 1 - 3 m. Uncleared, tall open-forest.

Soils—deep (>200 cm), well-drained Siliceous Sands (Uc1.21; Uc1.22) on sandplains, low dunes and shallow swales; and deep (>200 cm), poorly drained Siliceous Sands (Uc1.21; Uc1.23) in deeper swampy swales.

Qualities and Limitations—strongly to very strongly acid soils with slow surficial permeability (water repellent), high surficial organic matter, aluminium toxicity potential (localised) and low fertility. Non-cohesive soils, foundation hazard, permanently high watertables (localised), seasonal waterlogging (localised) and waterlogging (localised).

be *BELLINGER*

Landscape—level to undulating alluvial terraces and floodplains with small intermittent swamps on Quaternary alluvials in the Bellinger Valley. Local relief <3 m; slopes typically 0 - 5%; elevation >3 m. Cleared open-forest.

Soils—deep (>150 cm), structured Brown Earths (Gn3.21; Gn3.91), Brown Earths (Gn2.41) and Brown Podzolic Soils (Db1.11) on terraces and backplains; grading to deep (>150 cm), highly variable Alluvial Soils (Um5.5; Gn1.41; Gn4.31; Gn4.32) on recent floodplains.

Qualities and Limitations—soils with low to very low wet bearing strength, low permeability (localised), low subsoil fertility and acid sulfate soil hazard (localised). High water erosion hazard, high run-on, high foundation hazard, flood hazard (localised) and seasonal waterlogging (localised).

bn *BONVILLE*

Landscape—footslopes and drainage plains on Permian metasediments in the southern Gleniffer-Bonville Hills. Local relief and elevation generally 5 - 30 m; slopes 2 - 10%. Extensively cleared, tall open-forest.

Soils—moderately deep to deep (50 - 300 cm), imperfectly drained Prairie Soils (Gn3.71; Gn4.31) and Yellow Podzolic Soils (Dy4.51).

Qualities and Limitations—strongly to very strongly acid soils with high aluminium toxicity potential, high topsoil organic matter and low wet bearing strength. Seasonal waterlogging, high foundation hazard and high erosion hazard (localised).

bo *BOBO*

Landscape—very steep to precipitous hills on late Carboniferous metasediments of the Coffs Harbour Association in the Coast Range and Great Escarpment. Local relief to 260 m; slopes >50%; elevation up to 940 m. Partially cleared, tall open and tall closed-forest.

Soils—moderately deep, weakly structured Red Earths (Gn3.11; Gn4.11); with deep, imperfectly drained Red Podzolic Soils (Dr2.11) on footslopes; and very shallow, well-drained Lithosols (Um1.23) on very steep slopes with shallow soils.

Qualities and Limitations—strongly acid, stony, shallow (localised) soils with low fertility, high aluminium toxicity potential and low wet bearing strength. Very steep slopes, high mass movement hazard, high water erosion hazard, severe foundation hazard, shallow soils (localised on steepest slopes), rockfall hazard (localised on steepest slopes) and rock outcrop (localised).

bu *BUCCA*

Landscape—undulating rises on Tertiary gravels atop or flanking undulating low bedrock hills in the upper Bucca Valley. Local relief <30 m; slopes 0 - 10%; elevation 95 - 120 m. Completely cleared, tall open-forest.

Soils—moderately deep (>120 cm), well-drained Krasnozems (Gn3.11).

Qualities and Limitations—strongly acid (localised) soils with high topsoil organic matter, high topsoil permeability, low subsoil permeability, low subsoil fertility, aluminium toxicity potential (localised), low to very low wet bearing strength and high foundation hazard (localised). Water erosion hazard (localised).

bw *BAGAWA*

Landscape—steep hills on late Triassic to early Jurassic conglomerates of the Bundamba Group in the north-west of the Coffs Harbour region. Local relief 90 - 270 m; slopes to 40%; elevation up to 360 m. Partially cleared, tall open-forest.

Soils—deep (>150 cm), moderately to well-drained Yellow Podzolic Soils (Dy2.11; Dy3.21; Dy5.1) and Red Podzolic Soils (Dr2.11) on slopes; with deep (150 cm), moderately well-drained Yellow Earths (Gn2.41) on footslopes.

Qualities and Limitations—strongly acid soils with high aluminium toxicity potential, rapid topsoil permeability, slow to very slow subsoil permeability, high stoniness (localised) and low wet bearing strength (localised). Steep slopes, high water erosion hazard, high run-on, high foundation hazard and mass movement hazard (localised).

Landscape variant—bwa—steep low hills in the north-eastern Coffs Harbour region with local relief 30 - 90 m; slopes to 40%; elevation up to 180 m.

cc *COFFS CREEK*

Landscape—level to gently undulating floodplains, inset floodplains and terraces on Quaternary alluvium in the lower catchments of coastal streams draining the Gleniffer-Bonville Hills.

Soils—deep, moderately to poorly drained Alluvial Soils (Um4.23; Uc6.11), Yellow Podzolic Soils (Dy4.11; Dy4.51; 5.61) and Yellow Earths (Gn2.61) on floodplains; deep, moderately to poorly drained Red Podzolic Soils (Dr4.11) on drainage plains; moderately deep to deep, moderately well-drained Yellow Podzolic Soils (Dy4.11) and Yellow Earths (Gn2.21) on terraces; and deep, poorly drained Gleyed Podzolic Soils (Dg4.51) on drainage plains and floodplains in the middle Pine Creek catchment.

Qualities and Limitations—soils with low wet bearing strength, foundation hazard, high organic matter (topsoils), low fertility (subsoils), strong to very strong acidity (localised) and aluminium toxicity potential (localised). Flood hazard (localised), foundation hazard (localised), seasonal waterlogging (localised) and permanently high watertables (localised).

Landscape variant—cca—low lying level to gently undulating, elongate freshwater swamps on Quaternary alluvium in the lower catchments of coastal streams draining the Gleniffer-Bonville Hills.

cf *COFFS HARBOUR*

Landscape—low, flat to very gently undulating sandplain on Pleistocene beach and dune sand. Elevation <5 m; relief <2 m; slopes <3%. Extensively cleared, wet heathland.

Soils—deep, moderately to poorly drained Podzols (Uc2.31; Uc2.32; Uc2.34); with sandy Acid Peats and Peaty Podzols (Uc4.33) in swamps.

Qualities and Limitations—strongly acid soils with low to very low fertility, high wind erodibility (except pans), low available waterholding capacity, high organic matter (topsoils), rapid permeability (except cemented pans), very slow permeability (pans) and aluminium toxicity potential (localised). Flood hazard, seasonal waterlogging, permanently high watertables (swales and depressions), wind erosion hazard and non-cohesive soils.

ch *CHARLMONT*

Landscape—broad, flat to gently inclined, often elongated swampy floodplains and backplains along lower intertidal reaches of the Bellinger and Kalang Rivers. Local relief <10 m; slopes <2%; elevation <10 m. Almost completely cleared closed-scrub, open-scrub and herbland.

Soils—deep (>200 cm), poorly drained Yellow Podzolic Soils (Gn3.90; Dy5.11).

Qualities and Limitations—strongly to extremely acid, sodic, saline soils with high aluminium toxicity potential, high organic matter, low to very low wet bearing strength and slow subsoil permeability. Flood hazard, waterlogging, permanently high watertables, high to severe foundation hazard, high to severe acid sulfate soil hazard and high to severe foundation hazard.

ci *CORINDI*

Landscape—level to gently undulating floodplain and terraces on Quaternary alluvium in the valleys of the Corindi River catchment. Local relief to 10 m; slopes to 5%; elevation up to 45 m. Cleared, tall open-forest.

Soils—deep (>150 cm), moderately well-drained Brown Podzolic Soils (Db3.11; Db3.41; Db3.51) and structured plastic clays (Uf5.12).

Qualities and Limitations—highly erodible soils with low to very low wet bearing strength, high topsoil organic matter, slow subsoil permeability (localised), stoniness (localised), strong acidity (localised) and aluminium toxicity potential (localised). Flood hazard, seasonal waterlogging, water erosion hazard and foundation hazard (localised).

da *DAIRYVILLE*

Landscape—level to undulating alluvial terraces and floodplains on Quaternary alluvials in the upper Orara and Bucca Valleys and their tributary valleys. Local relief to 10 m; slopes to 5%, occasionally to 10%; elevation up to 190 m. Cleared closed-forest.

Soils—deep (>150 cm), moderately well-drained Alluvial Soils (Um4.22; Um5.52; Um6.23) on floodplains; with some deep (>150 cm), moderately well-drained structured sands (Uc6.11) as sand deposits; and moderately deep to deep (>120 cm), well-drained structured Brown Earths (Gn3.21) on terraces.

Qualities and Limitations—highly erodible, strongly acid soils with low to very low wet bearing strengths, aluminium toxicity potential and low subsoil fertility. Water erosion hazard, high run-on, foundation hazard (localised), flood hazard (localised), seasonal waterlogging (localised) and high watertables (localised).

de *DEADMANS*

Landscape—rolling hills to low hills on late Carboniferous metasediments of the Coffs Harbour Association in the drier northern parts of the Eastern Escarpment. Local relief to 180 m; slopes 5-20%, occasionally to 33%; elevation to 220 m. Partially cleared, tall open-forest and occasional tall closed-forest.

Soils—moderately deep to deep, structured Yellow Earths (Gn2.21; Uf4.43; Uf6.12; Um6.32; Gn4.81) and Yellow Podzolic Soils (Dy2.11; Dy2.12; Dy2.51; Dy4.1; Dy5.41); with Red Podzolic Soils (Dr5.21) and structured Red Earths (Gn3.1) on some upper slopes and in moister mid-slope locations.

Qualities and Limitations—strongly acid, commonly stony soils of low fertility, aluminium toxicity potential and low wet bearing strength. Water erosion hazard (localised), foundation hazard (localised) and steep slopes (localised).

gl *GLENREAGH*

Landscape—undulating low hills, long footslopes and drainage plains on early Jurassic-late Triassic conglomerates of the Bundamba Group in the lower Orara Valley, Corindi Valley and on the low relief plateau west of Corindi. Local relief to 110 m; slopes from 0 - 20%; elevation between 60 - 110 m. Partially cleared, tall open-forest.

Soils—moderately deep to deep (80 - 240 cm), well-drained Yellow Podzolic Soils (Dy3.5; Dy3.11; Dy5.11) and moderately deep to deep (100 - 180 cm), well-drained structured Red Earths (Um6.33; Gn3.13) on minor crests and slopes; with deep (>150 cm), imperfectly to moderately well-drained Yellow Solonetz Soils (Gn1.84), Yellow Podzolic Soils (Dy3.61; Dy4.81; Dy5.51), Brown Podzolic Soils (Db3.11; Db4.21) and structured Yellow Earths (Gn4.81) on colluvial footslopes.

Qualities and Limitations—strongly acid soils with slow subsoil permeability, aluminium toxicity potential, low fertility, high dispersibility (localised), high erodibility (localised) and strong sodicity (localised). Seasonal waterlogging (localised), high run-on (localised), high water erosion hazard (localised) and foundation hazard (localised).

gn *GLENIFFER*

Landscape—level to undulating, high relict alluvial terraces in the Orara and Bucca Valleys. Local relief <5 m; slopes <5%; elevation 60 - 90 m. Completely cleared, tall open and tall closed-forest.

Soils—moderately deep to deep (>100 cm), well-drained Krasnozems (Gn3.11; Gn3.14; Dr2.11; Dr5.11).

Qualities and Limitations—strongly acid soils with aluminium toxicity potential, low wet bearing strength, high topsoil organic matter, low subsoil organic matter, rapid topsoil permeability, slow subsoil permeability (localised) and low subsoil fertility. Water erosion hazard (localised on terrace edges), steep slopes (localised on terrace edges) and foundation hazard (localised).

go *GOOLAWAH*

Landscape—mainland and barrier beaches plus associated barrier foredune and incipient foredune on Quaternary (late Holocene) sands. Beach plains with relief and elevation <6 m; foredunes with slopes up to 45% and relief of 2 - 15 m. Mixed herbland/grassland to closed-scrub and closed-woodland on foredunes.

Soils—deep (>300 cm), well-drained Siliceous Sands (Uc1.21; Uc1.22)

Qualities and Limitations—strongly alkaline (localised) soils with extreme wind and wave erodibility, very low wet bearing strength, very low organic matter, very low available waterholding capacity, rapid permeability, very low fertility and strong salinity (localised). Wave erosion hazard, wind erosion hazard, non-cohesive soils, severe foundation hazard, steep slopes (localised) and waterlogging (beach).

ko *KOORALBYN*

Landscape—undulating rises, footslopes and drainage plains adjacent to steeper low hills and hills on Carboniferous metasediments of the Coffs Harbour Association in the Orara Valleys. Local relief to 40 m; slopes typically 5 - 10%, occasionally to 15%; elevation up to 200 m. Largely cleared, tall open and tall closed-forest.

Soils—deep (>150 cm), moderately well-drained Soloths (Dy3.11), Yellow Podzolic Soils (Dy4.11; Dy4.21; Dy5.11; Dy5.41) and structured Yellow Earths (Gn2.24).

Qualities and Limitations—strongly acid soils with aluminium toxicity potential, high subsoil erodibility, low wet bearing strength and low subsoil fertility. High water erosion hazard, foundation hazard, seasonal waterlogging (localised) and high run-on (localised).

lo *LOOK-AT-ME-NOW*

Landscape—undulating low hills, terminating to seaward in precipitous sea cliffs and wave-cut rock platforms on rounded headlands enclosing mainland beaches along the coastline of the Coffs Harbour region. Local relief 12 - 59 m; slopes 5 - 26%, occasionally steeper in cliff areas; elevation generally <60 m.

Soils—moderately deep to deep (>120 cm), stony, moderately well-drained Yellow Podzolic Soils (Dy5.11; Db2.11) and Brown Podzolic Soils (Db4.11); with moderately deep to deep (>120 cm), moderately well-drained Red Podzolic Soils (Dr5.21) and Brown Podzolic Soils (Db3.11; Db4.11) on more sheltered landward slopes.

Qualities and Limitations—strongly to very strongly acid soils with strong sodicity, low wet bearing strength, slow subsoil permeability and aluminium toxicity potential (localised). Water erosion hazard (localised), steep slopes (localised), shallow soils (localised) and rock outcrop (localised).

me *MEGAN*

Landscape—rolling low hills to hills on late Carboniferous metasediments of the Coffs Harbour Association in the Coast Range and Gleniffer-Bonville Hills. Local relief to 200 m; slopes typically 5 - 20%, occasionally to 33%; elevation to 317 m. Partially cleared, tall open-forest and tall closed-forest.

Soils—moderately deep to deep (>100 cm), well-drained structured Red Earths (Gn3.11), Red-brown Earths (Gn3.21), Brown Podzolic Soils (Db4.11) and Red Podzolic Soils (Dr2.11); with moderately deep to deep (>100 cm), structured Yellow Earths (Gn3.21) and Yellow Podzolic Soils (Dy4.11) in drier situations; moderately deep to deep (>100 cm), structured Yellow Earths (Gn3.71) on highly silty rocks; and moderately deep to deep (>120 cm), well-drained Krasnozems (Gn3.11; Gn3.14) in the moistest sites.

Qualities and Limitations—strongly acid, stony (localised) soils of high erodibility, aluminium toxicity potential and low subsoil fertility. Steep slopes (localised), mass movement hazard (localised), high water erosion hazard (localised) and foundation hazard (localised).

mo *MOONEE*

Landscape—undulating rises, footslopes and drainage plains adjacent to steeper low hills and hills on Carboniferous metasediments of the Coffs Harbour Association in the Coast Range and Gleniffer-Bonville Hills. Local relief <30 m; slopes typically 3 - 5%, occasionally 10%; elevation <20 m. Extensively cleared, tall open-forest and tall closed-forest.

Soils—moderately deep to deep (>100 cm), poorly-drained Humic Gleys (Uf6.41; Gn3.91).

Limitations—strongly to very strongly acid soils with aluminium toxicity potential, low to very low wet bearing strength, slow permeability, high subsoil erodibility, high subsoil sodicity and low fertility. Seasonal waterlogging, foundation hazard, water erosion hazard (localised) and permanently high watertables (localised).

nn *NEVER NEVER*

Landscape—very steep to precipitous mountains on late Carboniferous metasediments of the Coffs Harbour Association in the Dorrigo Escarpment and parts of the Coast Range. Local relief generally >300 m; slopes from 56% to >100%; elevation to 450 m.

Soils—deep, structured Red Earths (Gn3.11); with moderately deep to deep, structured Yellow Earths (Um6.32; Um6.34) on some exposed north facing upper slopes.

Qualities and Limitations—stony, strongly acid, slowly permeable soils of low fertility and high aluminium toxicity potential. Steep to very steep slopes, high to severe water erosion hazard, high to severe foundation hazard, high mass movement hazard (localised) and rockfall hazard (localised).

np *NEWPORTS CREEK*

Landscape—low, level to gently undulating coastal plains on Pleistocene estuarine sediments. Local relief <5 m; slopes <2%; elevation <10 m. Extensively cleared, closed-forest (swamp sclerophyll forest).

Soils—deep, poorly drained Yellow Podzolic Soils (Dy1.11; Dy3.61; Dy5.11) and Humic Gleys (Uf6.61).

Qualities and Limitations—strongly to very strongly acid, strongly sodic (localised), strongly saline (localised) soils with high aluminium toxicity potential, low to very low wet bearing strength, slow deep topsoil/subsoil permeability, high topsoil organic matter and low fertility. Flood hazard, seasonal waterlogging, foundation hazard and water erosion hazard (localised).

pl *PROMISED LAND*

Landscape—Undulating to rolling low hills to hills on relict Tertiary outwash fans at Promised Land. Local relief to 110 m; slopes 3 - 15%, occasionally to 33% in dissected areas; elevation up to 165 m.

Soils—deep (>200 cm), well-drained structured Red Earths (Gn3.11); with occasional deep (>180 cm), well-drained Yellow Podzolic Soils (Dy2.11).

Qualities and Limitations—strongly acid soils with high aluminium toxicity potential, very high erodibility (localised) and low subsoil fertility. Steep slopes (localised), high run-on (localised), high water erosion hazard (localised) and mass movement hazard (localised).

pn *PINE CREEK*

Landscape—undulating to rolling low hills to hills on Permian metasediments in the southern Gleniffer-Bonville Hills and the Bellinger Valley. Local relief up to 50 m; slopes 10 - 33%; elevation 5 - 60 m.

Soils—deep (>150 cm), moderately well-drained structured Brown Earths (Gn3.21) and Yellow Earths (Gn3.71) on crests and slopes; with deep (>150 cm), moderately well-drained Brown Podzolic Soils (Db1.11) and Yellow Podzolic Soils (Dy2.11) on steeper slopes.

Qualities and Limitations—strongly to very strongly acid soils with moderately low to low fertility, high aluminium toxicity potential, high topsoil organic matter, low topsoil/shallow subsoil wet bearing strength and slow subsoil permeability. High water erosion hazard, high run-on (localised) and steep slopes (localised).

ra *RALEIGH*

Landscape—long, narrow, curved fluvial levees and scrolls on the meander plain of the tidal Bellinger and Kalang Rivers. Local relief 1 - 5 m; elevation <10 m; slopes generally <2% on upper surfaces and up to 33% on side-slopes.

Soils—deep (>150 cm), moderately well-drained to poorly drained Alluvial Soils (Ufl.23; Uc5.21; Gn4.81; Dy4.11; Dg4.11).

Qualities and Limitations—strongly acid soils with high aluminium toxicity potential, low to very low wet bearing strength, high erodibility and low subsoil fertility. High water erosion hazard (localised along banks of major rivers), flood hazard (localised), seasonal waterlogging (localised) and foundation hazard (localised).

rr *RED ROCK*

Landscape—early Holocene, transgressive sand dunes overlying Pleistocene sandplains in the far north-east of the Coffs Harbour region. Elevation <12 m; slopes <15%; relief <15 m. Uncleared open-forest.

Soils—deep, rapidly-drained Siliceous Sands (Uc2.21).

Qualities and Limitations—strongly acid soils with high wind erodibility, very low available waterholding capacity, rapid permeability and low fertility. Non-cohesive soils and wind erosion hazard.

sc *SHERWOOD CREEK*

Landscape—floodplains and channels on Quaternary sandy alluvials in the Kremnos Plateau. Slopes to 3%; local relief <9 m; elevation 55 - 80 m.

Soils—deep (>150 cm), moderately well-drained Siliceous Sands (Uc1.24; Uc1.44; Uc4.23).

Qualities and Limitations—strongly acid, rapidly permeable soils with high topsoil organic matter and low fertility. Seasonal waterlogging, water erosion hazard (channelled flow), flood hazard (localised) and waterlogging (localised).

tm *TOORMINA*

Landscape—very low, level intertidal mudflats and sandflats, supratidal flats and adjacent swamps on Quaternary estuarine and alluvial deposits. Relief <1 m; slopes <2%; elevation <2 m. Largely uncleared mangroves, saltmarsh, herbland and closed littoral forest.

Soils—deep (>200 cm), poorly drained Humic Gleys (Dy5.51; Dy5.61) in undisturbed areas; deep (>200 cm), poorly drained Humic Gleys (Um6.22; Gn2.81; Dy5.52) in drained areas; and deep (>200 cm), poorly drained Alluvial Soils (Um6.21; Gn2.03) in areas of estuarine sand deposition.

Qualities and Limitations—strongly to extremely acid, strongly saline, strongly sodic soils with high aluminium toxicity potential, very high topsoil organic matter, very low subsoil permeability, low to very low wet bearing strength and low to very low fertility. Flood hazard, seasonal waterlogging, permanently high watertables, high to severe potential/actual acid sulfate soil hazard and severe foundation hazard.

tw *TALLAWUDJAH*

Landscape—undulating to rolling low hills to hills on early Jurassic-late Triassic conglomerates of the Bundamba Group in the Kremnos Plateau and Coast Range. Local relief to 130 m; slopes to 33%; elevation up to 570 m. Partially cleared, tall open-forest.

Soils—deep (>150 cm), moderately well-drained Yellow Podzolic Soils (Dy1.11; Dy2.11; Dy3.11; Dy3.51; Dy3.61; Dy4.21) and Brown Podzolic Soils (Db1.11); with moderately deep to deep (>150 cm), structured Red Earths (Gn2.11),

Yellow Earths (Gn3.71), Brown Earths (Gn1.41; Gn2.02) and Red Podzolic Soils (Dr5.11) in lower, more sheltered areas.

Qualities and Limitations—strongly acid, generally highly erodible, slowly permeable soils with low wet bearing strength, high aluminium toxicity potential and low subsoil fertility. High water erosion hazard, high run-on (localised), steep slopes (localised) and foundation hazard (localised).

ul *ULONG*

Landscape—rolling low hills on late Carboniferous metasediments of the Coffs Harbour Association in the Coast Range and Gleniffer-Bonville Hills. Local relief to 90 m; slopes 5 - 20%, occasionally to 33%; elevation to 360 m. Partially cleared, tall open-forest and tall closed-forest.

Soils—moderately deep to deep (>100 cm), well-drained structured Red Earths (Gn3.11), Brown Earths (Gn3.71), Red Podzolic Soils (Dr4.11) and Red-brown Earths (Dy2.12); plus deep (>150 cm), well-drained Krasnozems (Gn3.21; Gn3.14) in moistest areas; and moderately deep (>100 cm), imperfectly drained Yellow Podzolic Soils (Dy2.21; Dy2.41; Dy4.21) in drier areas.

Qualities and Limitations—strongly to very strongly acid soils with low wet bearing strength, subsoil aluminium toxicity potential and low subsoil fertility. Water erosion hazard (localised), steep slopes (localised) and high run-on (localised).

xx *DISTURBED TERRAIN*

Landscape—made land varying from level plains to undulating terrain disturbed by human activity to at least 100 cm depth. Original soil has been removed, greatly disturbed or buried. Local relief <30 m; slopes <10%. Landfill includes soil, rock, building and waste materials. Original vegetation has been completely cleared.

Qualities and Limitations—dependant on nature of fill material; may include mass movement, subsidence, poor drainage, low to extremely low fertility and soil toxicity potential including acid sulfate soils. Care must be taken when such sites are developed. A survey at a suitable scale plus geotechnical analysis should be undertaken because of the variability of soil materials. Advice from local councils should be sought concerning localised areas of disturbed terrain.

2.2 SOIL LANDSCAPES OF THE MACKSVILLE - NAMBUCCA 1:100 000 SHEETS

ae *AUSTRAL EDEN*

Landscape: Levees of the lower Macleay fluvial-deltaic plain. Local relief <5m, elevation <10m, slopes <2% on plains and upper surfaces, to 15% on side-slopes. Subtropical rainforest, mostly cleared for improved pasture, with gallery mangroves.

Soils: >300cm well drained Brown Kandosols (alluvial soils, chernozems, some gradational yellow earths).

Significant Soil and Land Qualities: Low wet-bearing strength. High streambank erosion hazard, localised seasonal waterlogging, prime agricultural land.

Landscape Variant aea: Levee backslopes, with less well-drained soils.

bg *BORIRGALLA*

Landscape: Level backbarrier sandplain swamps and floodbasins over Pleistocene muddy sands. Very low elevation and relief. Swamp sclerophyll forests (partly cleared for grazing), sedgelands, wet heath and saltmarsh.

Soils: Moderately deep (50-100 cm) poorly drained Hydrosols (humic gleys), Grey Chromosols (gleyed podzolic soils) and Aquic Podosols (groundwater podzols), all overlying estuarine clayey sands.

Significant Soil and Land Qualities: Low wet bearing strength, acidity, localised salinity, very low water-holding capacity, acid sulphate soils, non cohesive soils; shallow water tables, waterlogging, flooding.

Landscape variant - bga: Estuarine variant. Broad supratidal flats.

br *BOWRA CREEK*

Landscape: Narrow, often slightly convex alluvial fans on footslopes grading to drainage depressions, below erosional landscapes on the Nambucca Beds (Pn). Low local relief (5-30m), low elevation (5-50m), slopes 1-10%. Open swamp sclerophyll forests, often cleared for pasture.

Soils: 100-200cm imperfectly drained Haplic Yellow or Brown Kandosols (yellow or brown earths) in fans and in drainage depressions, with Mottled Grey or Yellow Kurosols (gleyed podzolic soils) on footslopes.

Significant Soil and Land Qualities: Acidic soils, potential aluminium toxicity, low fertility, very low permeability, low wet bearing strength, erodible. High run-on, groundwater discharge, localised flood hazard, waterlogging, foundation hazards; not suitable for on-site effluent disposal.

bs *BIG SMOKY*

Landscape: Rolling to steep hills, on granitics (Rc). Local relief 90m to >300m, elevation 20m - >300m, slopes 25-50%. Mostly uncleared open (dry sclerophyll) forest.

Soils: 50cm well drained Leptic Tenosols (lithosols) on crests & steep slopes, and100-180cm moderately well-drained Red Dermosols and Chromosols (red podzolic soils) on sideslopes & lower slopes.

Significant Soil and Soil Qualities: Highly erodible, shallow, acidic, sodic, sandy, hardsetting soils of low fertility and low water-holding capacity. High erosion and mass movement hazards, rock outcrop.

Landscape Variant - bsa: Erosional variant on gradients 12%-25%.

ca *CAIRNCROSS*

Landscape: Narrow drainage depressions grading to broad drainage plains, below low hills of the Kempsey Beds (Cpkx). Slopes <3%, local relief <2m, elevation 5-20m. Open dry sclerophyll and swamp forest, often partly cleared.

Soils: Very deep (>300cm), poorly drained, Mottled Brown or Grey Sodosols (solods) and Kurosols (gleyed podzolic soils).

Significant Soil and Land Qualities: Sodic, hardsetting soils, very low permeability, high erodibility, low wet bearing strength. Acidic, high aluminium toxicity potential, low fertility. High run-on, localised flood hazard, waterlogging, foundation hazards. Not suitable for effluent disposal.

cf *COFFS HARBOUR*

Landscape: Low Pleistocene inner-barrier beach-ridge plain. Local relief 1-9m (usually <3m), elevation <10m, slopes <5%. Low open forest, cleared in places for sand mining, pastures and horticulture.

Soils: >300 cm rapidly drained Aeric Podosols on rises; >300cm imperfectly drained Semiaquic and Aquic Podosols in swales, over deep water tables.

Significant Soil and Land Qualities: High wind erosion risk. Highly erodible, highly permeable, rapidly drained, highly infertile, non cohesive soils, with very low available water-holding capacity.

ch *CHARLMONT*

Landscape: Level estuarine backswamps and floodbasins along the lower Kalang River. Local relief <1m, elevation <5m. Often extensively drained. Wet meadow and sedgelands with open swamp sclerophyll forests.

Soils: >200cm poorly-drained Sulphidic Hydrosols (humic gleys) and Sulphidic Organosols (acid peats).

Significant Soil and Land Qualities: Strongly to extremely acid, sodic, saline soils with high aluminium toxicity potential, high organic matter, low to very low wet bearing strength and slow subsoil permeability. Flood hazard, permanently high watertables, high foundation hazard, high to severe acid sulfate soil hazard.

ck *CHRISTMAS CREEK*

Landscape: Level estuarine backswamps and floodbasins along the lower Macleay floodplain. Local relief <1m, elevation <5m. Often extensively drained. Wet meadow and sedgelands.

Soils: >200cm poorly-drained Sulphidic Hydrosols (humic gleys) and Sulphidic Organosols (acid peats).

Significant Soil and Land Qualities: Strongly to extremely acid, sodic, saline soils with high aluminium toxicity potential, high organic matter, low to very low wet bearing strength and slow subsoil permeability. Flood hazard, permanently high watertables, high foundation hazard, high to severe acid sulfate soil hazard.

di

DIEHAPPY

Landscape: Steep to very steep dissected hills, on metasediments of the Nambucca Beds (Pn). Local relief 100-300m, elevation 50-550m, slopes 33-55%. Tall open forests, sometimes cleared for grazing and bananas.

Soils: <70cm, Leptic Tenosols (lithosols), with localised 100-180cm well-drained Brown Kurosols (red podzolic soils).

Significant Soil and Land Qualities: Shallow, acidic, stony soils of low soil fertility. Steep to very steep slopes, high run-on, shallow stony soils, localised mass movement hazard.

Landscape Variant - dia: Very steep slopes, gradients >50%.

Landscape Variant - dib: Rain shadow area west from Hickeys Creek.

eu

EUROKA

Landscape: Rolling low hills with broad crests, on mudstones of the Kempsey beds (CPkx). Slopes 10-33% (mostly 15-25%), local relief 30-50m, elevation 10-110m. Open dry sclerophyll forest, partly cleared.

Soils: 100-150cm imperfectly drained Mottled Natric Yellow Kurosols (soloths), Brown Kurosols (yellow podzolic soils), and Mottled Brown and Red Chromosols (red podzolic soils).

Significant Soil and Land Qualities: Strongly acidic, sodic, low permeability, hardsetting surfaces, low wet bearing strength, seasonal waterlogging, gully erosion hazard, not suitable for effluent disposal.

gd

GLADSTONE

Landscape: Levee backslopes on modern alluvium in the mid to lower reaches of Macleay River. Slopes <1%, relief <3m, elevation 1-5m. Swamp sclerophyll forest, extensively cleared for grazing.

Soils: 100-200cm imperfectly to poorly drained Brown Kandosols (alluvial soils, chernozems, some gradational yellow earths), overlying esuarine sands and clays.

Significant Soil and Land Qualities: Moderate erodibility, high salinity, strongly sodic, low permeability, potential acid sulphate sub-soils. Flooding hazard, seasonal waterlogging (localised), permanently high watertables, foundation hazard, very low wet bearing strength.

go

GOOLAWAH

Landscape: Mainland and barrier beaches, foredunes, hind dunes and backplains on Holocene sands. Beaches and backplains with elevation and relief <3m, slopes <3%; dunes with relief <15m and slopes 20-60%. Mostly bare sand with some spinifex grassland / herbland, and low shrubland on dunes.

Soils: Deep (>300cm), rapidly drained sandy Arenic Rudosols (silicious sands) on beaches and weakly developed Aeric Podosols (podzols) on dunes.

Significant Soil and Land Qualities: Non-cohesive, highly permeable soils of very low fertility and low available water-holding capacity. Extreme wind and wave erosion hazard and localised steep slopes.

Landscape variant - goa: Stable foredunes and hind dunes.

Landscape variant - gob: Disturbed foredunes.

Landscape variant - goc: Backplains.

kg

KUNDABUNG

Landscape: Undulating rises and low hills, on mudstones of the Kempsey beds (CPkx). Local relief 10-30m, elevation 5-50m, slopes 5-10%. Open dry sclerophyll forest, partly cleared.

Soils: 100-150cm, poorly drained Mottled Natric Red or Brown Kurosols (solods and red podzolic soils).

Significant Soil and Land Qualities: Strongly acidic, sodic, erodible soils. Hardsetting surfaces, low wet bearing strength, high run-on, seasonal waterlogging, gully erosion hazard, not suitable for effluent disposal.

ma *MACLEAY ARM*

Landscape: Narrow extratidal floodplains of coastal interbarrier streams. Mixed Quaternary estuarine and barrier sands. Elevation <2m, level. Sedgeland and swamp sclerophyll forest.

Soils: Moderately deep (60-100cm), poorly drained Oxyaquic and Extratidal Hyrosols (humic gleys and solonchaks) and Sapric Organosols (peats).

Significant Soil and Land Qualities: High ASS risk, salinity; organic soils, low fertility and very low available water-holding capacity, non cohesive soils, high permeability, flooding hazard, shallow water tables.

mr *MARIA RIVER*

Landscape: Level fluvial-deltaic plains, backswamps and flood basins of the lower Macleay River. Local relief <3m, elevation <10m, slopes <2%. Wet meadow and sedgeland with open swamp sclerophyll forests.

Soils: >200cm poorly-drained Redoxic and Oxyaquic Hydrosols (humic gleys).

Significant Soil and Land Qualities: Low wet-bearing strength, acid sulfate soil hazard. Localised flood hazard, localised seasonal waterlogging.

Landscape Variant - mrw: Swamp variant, prior channels.

my *MACLEAY RIVER*

Landscape: Narrow to broad (50-500m) low inset terraces and floodplains to the Macleay River and smaller streams draining the Kempsey beds (CPkx). Local relief <10m, elevation 20-100m, slopes 3-10% (mostly <5%, up to 50% on terrace edges). Riverine and tall open forest, extensively cleared.

Soils: >300cm moderately well drained Brown Kandosols (brown earths & prairie soils), with 50-200cm well drained gravelly Stratic Rudosols (alluvial soils) on channel bars and occasionally on floodplains.

Significant Soil and Land Qualities: High erodibility, high permeability, gravelly soils, low available water holding capacity; localised stream bank erosion, high run-on, foundation hazard, localised flood hazard, localised seasonal waterlogging.

Landscape variant - myb: Narrow gravelly meander plains and valley flats in upper reaches.

ne *NEWRY*

Landscape: Undulating low hills, on metasediments of the Nambucca Beds (Pn). Local relief 10-30m, elevation 5-40m, slopes 5% to 20%. Tall open forests, often cleared for grazing, horticulture and urban development.

Soils: Moderately well drained, 100-180cm gravelly Red and Brown Kurosols (red podzolic soils), with 200cm Brown Kurosols and Dermosols (brown podzolic soils, xanthozems and prairies soils) on footslopes.

Significant Soil and Land Qualities: Erodible, acidic soils. High run-on, low wet bearing strength, rill and gully erosion.

nr *NAMBUCCA RIVER*

Landscape: Narrow to moderately broad floodplain and terrace surfaces, with minor depressions and drainage lines and narrow braided channel, draining the Nambucca Beds (Pn). Local relief <10m, elevation <100m, slopes mostly <5% (up to 50% on banks). Extensively cleared riverine forests.

Soils: >300cm moderately well drained Brown Kandosols (brown earths and prairie soils) and Red Kandosols (red earths) and 50-200cm well drained gravelly Stratic Rudosols (alluvial soils).

Significant Soil and Land Qualities: Highly erodible, well drained, acid, gravelly soils, low available water holding capacity. Stream bank erosion, high run-on, foundation hazard, localised flood hazard, localised seasonal waterlogging.

Landscape Variant nra: Mappable higher terrace elements.

Landscape Variant nrb: Narrow gravelly meander plain and valley flats in upper reaches.

pc *PIPERS CREEK*

Landscape: Level alluvial terraces to coastal streams draining mudstones. Developed on Late Pleistocene alluvium. Slopes <1%, relief <1m, elevation 5-9m. Open dry sclerophyll forest, partially clear

Soils: >300cm Brown Sodosols (soloths) and Brown or Yellow Kurosols (yellow podzolic soils).

Significant Soil and Land Qualities: Strongly sodic, hardsetting, low wet bearing strength, very strongly acid, moderate erodibility, dispersible, low fertility, high aluminium toxicity potential. Flooding hazard, seasonal waterlogging.

pn *PINE CREEK*

Landscape: Rolling hills, on metasediments of the Nambucca Beds (Pn). Local relief 90-200m, elevation 20-300m, slopes 20-33% (commonly 25%). Various tall open *Eucalyptus pilularis* forests, often cleared for grazing and horticulture.

Soils: Moderately well drained, 100-180cm gravelly Red and Brown Kurosols and Chromosols (red podzolic soils) are widespread, localised <70cm Leptic Tenosols (lithosols) on lithic sandstone substrates, 200cm Brown or Red Dermosols (brown podzolic soils, xanthozems and prairie soils) on footslopes.

Significant Soil and Land Qualities: Erodible, locally shallow, stony, acidic soils. Locally steep; rill and gully erosion.

Landscape Variant - pna: Rain shadow area west from Hickeys Creek.

rn *RHONES CREEK*

Landscape: Rolling hills, mid and lower slopes, on metasediments of the Nambucca Beds (Pn). Local relief 90-200m, elevation 20-300m, slopes 25%-33%. Tall open forests, often cleared for grazing and banana plantations.

Soils: 100-180cm, stony, moderately well-drained Red Chromosols and Red Kurosols (red podzolic soils) and uncommon <70cm Leptic Tenosols (lithosols) on hillslopes, with 120cm, well-drained Red Dermosols (kraznozems) on lower slopes.

Significant Soil and Land Qualities: Locally shallow, stony, acidic soils of low to moderate fertility and low to moderate water-holding capacity. Locally steep, high run-on, terracettes, landslips.

rw *ROSEWOOD ROAD*

Landscape: Undulating to rolling low hills on lower slopes, on hornfels (Rc) and siltstones (Pnpf). Local relief 30-100m, elevation 10-300m, slopes 10-25%, occasionally to 33%. Tall open forests, often cleared for grazing and horticulture.

Soils: 160-200cm well-drained Red Chromosols (red podzolic soils) and Red Ferrosols (kraznozems).

Significant Soil and Land Qualities: Erodible, stony, acidic soils of moderate to high fertility. Gully and rill erosion; significant horticultural land.

Landscape Variant - rwa: Residual landscapes on gentle to undulating rises, slopes <10%.

se *SEVEN OAKS*

Landscape: Level estuarine backswamps and floodbasins. Local relief <1m, elevation <5m. Often extensively drained. Wet meadow and sedgelands with open swamp sclerophyll forests.

Soils: >200cm poorly-drained Sulphidic Hydrosols (humic gleys) and Sulphidic Organosols (acid peats).

Significant Soil and Land Qualities: Strongly to extremely acid, sodic, saline soils with high aluminium toxicity potential, high organic matter, low to very low wet bearing strength and slow subsoil permeability. Flood hazard, permanently high watertables, high foundation hazard, high to severe acid sulfate soil hazard.

si *SHARK ISLAND*

Landscape: Level intertidal swamps on Holocene sands and muds. Elevation 0-2m. Mangroves, saltmarsh, swamp sclerophyll forests.

Soils: Sulphidic Intertidal and Supratidal Hydrosols (humic gleys and solonckaks), with Arenaceous Intertidal Hydrosols (silicious sands) on sand flats.

Significant Soil and Land Qualities: High ASS risk; low fertility and very low available water-holding capacity, non cohesive soils, shallow water tables.

Landscape Variant - sia: Sandy tidal deltas.

sp *STUARTS POINT*

Landscape: Low Pleistocene inner-barrier beach-ridge plain. Local relief 1-9m (usually <3m), elevation <10m, slopes <5%. Low open forest, cleared in places for sand mining, pastures and horticulture.

Soils: >300cm rapidly drained Aeric Podosols(podzols) on rises and >300cm imperfectly drained Semiaquic and Aquic Podosols (humus podzols) in swales, over deep water tables.

Significant Soil and Land Qualities: Highly erodible, highly permeable, rapidly drained, highly infertile, non cohesive soils, with very low available water-holding capacity. High wind erosion risk.

Landscape Variant spa: Wet variant with extensive swale swamps.

Landscape Variant spb: Sandplain with anomalous soils, with possible alluvial influence.

Landscape Variant spc: Shell middens.

tb *TAMBAN*

Landscape: Rolling to steep hills and low dissected plateaus, on lithic sandstones of the Kempsey beds (CPkx). Local relief 50-100m, elevation 50-200m, slopes 10-33%, occasionally to 50%. Open forests partly cleared.

Soils: 50-100cm moderately well drained Brown Kurosols (red podzolic soils) and Brown Kandosols (yellow earths), with <70cm Leptic Tenosols (lithosols) on ridges.

Significant Soil and Land Qualities: Strongly acidic, erodible, locally shallow, stony soils, low water holding capacity. Hardsetting surfaces, low wet bearing strength, water erosion hazards.

tm *TOORMINA*

Landscape: Level intertidal swamps on Holocene sands and muds. Elevation 0-2m. Mangroves, saltmarsh, swamp sclerophyll forests.

Soils: Sulphidic Intertidal and Supratidal Hydrosols (humic gleys), with Arenaceous Intertidal Hydrosols (alluvial soils) on sand flats.

Significant Soil and Land Qualities: High ASS risk; low fertility and very low available water-holding capacity, non cohesive soils, shallow water tables.

vl *VALLA*

Landscape: Undulating low foothills on granitics (Rc). Local relief 20-90m, elevation 10-100m, slopes 5% to 20% (generally <10%). Open dry sclerophyll forest and tall open forest, partly cleared.

Soils: 100-180cm moderately well-drained Red Dermosols (red podzolic soils) on crests and side-slopes; 90-180cm poorly drained Yellow Chromosols (yellow podzolic soils) in areas of poor drainage.

Significant Soil and Land Qualities: High run-on, localised rock outcrop. Highly erodible, acidic, sodic, hardsetting soils of low fertility and low water-holding capacity.

Landscape Variant - vla: Residual variant on low hillcrests.

wa *WARRELL CREEK*

Landscape: Gentle to undulating residual alluvial terraces and re-worked fans, of Tertiary age. Local relief 10-30m, elevation 10-50m, slopes 3-15%. Tall open *Eucalyptus grandis* forests with subtropical rainforest, extensively cleared for grazing and horticulture.

Soils: 200-300cm, well drained Red Ferrosols (kraznozems), with imperfectly drained Mottled Brown Chromosols (red podzolic soils).

Significant Soil and Land Qualities: Deep acidic soils of high fertility and good water holding capacity. Moderate rill erosion hazard, otherwise high agricultural and horticultural suitability.

ww *WAY WAY*

Landscape: Steep to very steep hills and escarpment, on hornfels (Rc). Local relief 90-400m, elevation 100-500m, slopes 33%-70%. Tall open forests, sometimes cleared for bananas.

Soils: 100-200cm well drained Red Dermosols and Red Chromosols (red podzolic soils), and 150cm imperfectly drained Brown Chromosols (soloths) on side slopes, with <25cm Leptic Tenosols (lithosols) on crests and steep upper slopes.

Significant Soil and Soil Qualities: Erodible, shallow, stony, acidic soils of generally low to moderate fertility. Landslips and debris avalanches.

Landscape Variant - wwa: Mt Yarrahapinni escarpment, gradients >50%

ya *YARRAHAPINNI*

Landscape: Rolling low hills, as colluvial footslopes derived from hornfels (Rcyg). Local relief 30-120m, elevation 20-150m slopes 15-33%. Tall open forests, extensively cleared for horticulture.

Soils: >200cm, well-drained Red Ferrosols (kraznozems).

Significant Soil and Land Qualities: Erodible, deep acidic soils of high fertility and good water holding capacity. High run-on, locally steep, gully erosion.

2.3 SOIL LANDSCAPES OF THE KEMPSEY 1:100 000 SHEET

ae *AUSTRAL EDEN*

Landscape– Broad undulating ridges and swales on modern alluvium forming levees in the mid to lower reaches of the major rivers. Generally level with local short slopes to 20%, relief < 3 m, elevation 2 - 10 m, previous rainforest completely cleared for cropping and grazing.

Soils– Deep (>300 cm) well drained uniform loams forming Alluvial Soils (Um5.52) and Chernozems (Um6.12), some gradational Yellow Earths (Gn2.41, Gn2.81)

Limitations– Flooding hazard, wind erosion hazard (localised), streambank erosion hazard (localised), non-cohesive soils, high plasticity, low wet bearing strength, high erodibility, high permeability

bf *BELGRAVE FALLS*

Landscape– Fluvial channels, bars and point bars on fluvial reaches of major streams. Includes modern scour and accretion surfaces. Riparian vegetation dominated by river oak.

Soils– Deep (> 300 cm) well drained stratified Alluvial Soils (Uc1.23) and gravels.

Limitations– Extreme flood hazard, high water erosion hazard, non-cohesive soil materials, stoniness, high erodibility, low fertility, low available water holding capacity.

bl *BELMORE*

Landscape– Extensive flat swamp floor of very low elevation (0 - 1 m). Seasonally inundated. Holocene estuarine lagoonal infill sediments. Swamp complex vegetation with distinctive zoning related to waterlogging and soil acidity.

Soils-- Deep (>300 cm) very poorly drained Humic Gleys (Uf6.51) and Acid Peats (O).

Limitations– Flooding hazard, waterlogging, low wet bearing strength, organic soils, actual and potential acid sulphate soils, extreme acidity, high aluminium toxicity, salinity.

Landscape Variant - blt– slightly elevated lee shore.

bp *BLACKMANS POINT*

Landscape– Tidal flats and creeks in coastal inlets and estuaries regularly inundated by tidal salt waters. Elevation and relief are < 1 m and slopes < 1%. Holocene estuarine sediments. Littoral complex vegetation.

Soils– Deep (>300 cm) very poorly drained Solonchaks (Uf6.41, Dy1.53) and Calcareous Sands (Uc1.11)

Limitations– Flooding hazard, waterlogging, low wet bearing strength, organic soils, potential acid sulphate soils, very strongly sodic, very strongly saline, high erodibility.

Landscape Variant - bpm – sandy materials variant in higher energy environments.

bw *BEECHWOOD*

Landscape– Undulating and rolling low hills in the lower valley sides. Slopes are typically 10 - 20 %, relief 30 - 90 m, elevations 20 - 60 m and up to 90 m on black mudstone of the Beechwood Beds (Peb). Tall open forest cleared for grazing.

Soils– Shallow (< 100 cm) to moderately deep (140 - 180 cm) Red Podzolic Soils (Dr4.21, Dr2.21) and Krasnozems (Gn4.11)

Limitations-- Water erosion hazard (gullying), shallow stony soils (localised), seasonal waterlogging, very strongly acid, high aluminium toxicity potential, high erodibility, low to moderate available water-holding capacity.

ca *CAIRNCROSS*

Landscape– Gently inclined (1 - 3%) broad open depressions and footslopes of low relief (< 2 m) and low elevation (1 - 5 m) linking residual areas with depositional areas. Swamp complex vegetation.

Soils– Moderate to deep (200 to > 300 cm) poorly drained Humic Gleys (Uf6.33, Uf6.51), Soloths (Dy2.41) and Yellow Podzolic Soils (Dy5.21, Dy3.11)

Limitations– Flooding hazard (localised), waterlogging, run-on, foundation hazards. Low wet bearing strength, sodic, high erodibility, very low permeability, strongly acid, high aluminium toxicity, low fertility, moderate available water-holding capacity.

cc *CONNECTION CREEK*

Landscape– Level, swampy, linear open depressions and supratidal flats with narrow central channel and minor tidal influence. Relief and elevation are < 1 m. Holocene estuarine and alluvial sediments. Vegetation is thick stands of swamp oak.

Soils– Deep (>300 cm) very poorly drained Acid Peats (O), Humic Gleys (Uf6.61, Dd1.11) and Soloths (Dd3.11).

Limitations– Flooding hazard, waterlogging, foundation hazards, low wet bearing strength, organic soils, sodicity, acidity, salinity, aluminium toxicity, acid sulphate soils.

ck *CHRISTMAS CREEK*

Landscape– Backswamps and floodbasins forming extensive swamps of extremely low relief and low elevation (1 - 2 m). Located on the floodplain usually adjacent to residual terrain. Holocene alluvium with swamp complex vegetation

Soils– Deep (> 300 cm) poorly drained Acid Peats (O), Humic Gleys (Uf6.42, Uf6.61, Uf6.51) and Solonchaks (Uf6.41).

Limitations– Regular flooding hazard, waterlogging, foundation hazards, high plasticity, low wet bearing strength, organic soils (localised), sodicity (localised), low permeability, extremely acid, high aluminium toxicity potential, low fertility, acid sulphate soils (localised).

co *COMBATINE*

Landscape– Upper waxing slopes of steep hills formed on lithic sandstones with 33 -50% slopes and 90 - 300 m elevation and relief. Tall open wet and dry sclerophyll forests. Private forested land and State forests.

Soils–Varies with depth over rock. Shallow (< 70 cm) Lithosols (Um1.44, Uc6.14, Um5.51) occur on ridges and midslopes. Moderately deep (120 cm) gradational soils (Gn2.94), Yellow Earths (Gn2.21) and Chocolate Soils (Db3.11) occur where heavier subsoil material is in-situ.

Limitations– Steep slopes, water erosion hazard, shallow soils, mass movement (localised) moderate erodibility, low available water-holding capacity, low fertility, stony.

Landscape Variant - cos– Steeper elements with slopes above 50% are mapped as **cos.** These are colluvial landscapes with similar soils and limitations to Kogo soil landscape (**ko**).

cp *COOPERABUNG*

Landscape– Rolling hills and rolling low hills, slopes typically 20 - 33% but ranging from 10 - 33%. Relief 30 - 300 m, elevation <200 m. Found on a range of siltstones, mudstones and lithic sandstones. Tall open dry sclerophyll forest on upper slopes and tall open wet sclerophyll forest on lower slopes.

Soils– Wide range of soils ranging from shallow to moderately deep with well structured red, brown and yellow clay subsoils. Includes Lithosols (Um2.12), Yellow Earths (Gn2.81), Krasnozems (Gn4.31), Brown Podzolic Soils (Db1.11), Yellow Podzolic Soils (Dy4.11, Dy4.51) and Red Podzolic Soils (Dr2.11,

Limitations– Shallow, stony soils with moderate to high erodibility, dispersible, low available water-holding capacity, low fertility.

de *DELICATE*

Landscape– Extensive flat coastal swamps of extremely low relief (<1 m) and low elevation (<1 m) on backbarrier sandplains overlain by thin alluvial sediments. Tall closed swamp sclerophyll forest.

Soils– Deep (>300 cm) poorly drained alluvial clay loams overlying sands. Often no suitable group. Some Humus Podzols (Uc5.11).

Limitations– Flooding hazard, waterlogging, low wet bearing strength, acidity, salinity, acid sulphate soils.

eu *EUROKA*

Landscape– Rolling low hills on Permian mudstones of the Kempsey Beds (Pek) and Beechwood Beds (Peb) with slopes 10 - 15% rising to 33% at times, elevation 20 - 90 m and relief 20 - 60 m. Tall open dry sclerophyll forest, partially cleared.

Soils– Shallow (<100 cm) Red, Yellow and Brown Podzolic Soils (Dr2.21, Dy2.21, Db1.11). Where topsoils are heavier texture there are moderately deep (< 120 cm) Krasnozems (Gn3.14), Prairie Soils (Gn3.34) and uniform loams (Um4.41).

Limitations– Seasonal waterlogging (localised), shallow soils (localised), gully erosion hazard, low wet bearing strength, very strongly acid, very high aluminium toxicity potential, low permeability.

gd *GLADSTONE*

Landscape– Levee footslopes and low relief levees on modern alluvium in the mid to lower reaches of the major rivers. Slopes < 1%, relief < 3 m, elevation 1 - 5 m. Scattered paperbark and swamp oak, extensively cleared for grazing.

Soils-- Deep (> 300 cm) imperfectly drained Alluvial Soils (Um5.52), Yellow Earths (Gn2.81) and Euchrozems (Uf6.31) on upper slopes with deep (> 300 cm) poorly drained Humic Gleys (Uf6.51) on the lower slopes and in swampy depressions.

Limitations-- Flooding hazard, seasonal waterlogging (localised), permanently high watertables, foundation hazard, very low wet bearing strength, moderate erodibility, very high salinity, very strongly sodic, low permeability, potential acid sulphate sub-soils.

Landscape Variant - gdt -- lee shore to Belmore Swamp
Landscape Variant - gdw-- swampy depressionswithin **gd**.

hh *HAT HEAD*

Landscape-- Level back barrier sandplain swamps of low elevation (1 - 3 m) and extremely low relief (< 1 m), gently inclined (< 1%) swales and perched swamps within the higher sand dunes at about 5 m elevation. Formed on Pleistocene barrier sands. Various sedgeland associations and wet heath.

Soils-- Deep (> 300 cm) poorly drained Acid Peat Soils (O) and Humus Podzols (Uc5.31, Uc4.23, Uc4.32)) in wetter areas with Podzols (Uc2.21, Uc2.32) elsewhere.

Limitations-- Localised flooding hazard, seasonal waterlogging, localised organic soils, non-cohesive soils, high wind erosion risk, low soil fertility.

Landscape Variant hhw - Open water and wetter swale swamps.

kg *KUNDABUNG*

Landscape -- Undulating rises with broad crests and extensive footslopes and drainage plains on Permian mudstones of the Kempsey beds (Pek) and Beechwood beds (Peb). Slopes range from 3 - 10% (often < 5%) with elevations and relief 5 - 30 m. Tall, open, dry sclerophyll forest, 10% cleared.

Soils-- Shallow to deep (<100 - >300 cm) poorly drained hardsetting Soloths (Dr2.41, Dy2.31) and Grey - Brown, Yellow and Red Podzolic Soils (Db1.21, Db1.42, Dy2.11, Dy2.31, Dr2.21). Gleyed Podzolic Soils (Dd1.3) occur with Humic Gleys (Uf6.61) in drainage depressions.

Limitations-- Seasonal waterlogging, water erosion hazard, foundation hazards, run-on (localised), shallow soils (localised), hardsetting, erodible, sodic, acidic soils, with low wet bearing strength, low permeability, and high aluminium toxicity potential.

ki *KILLICK*

Landscape-- Pleistocene barrier dunes and high transgressive dunes with low relief of 9 - 70 m (usually < 30 m), elevations < 70 m and slopes of 10 - 50%. Dry sclerophyll forest, uncleared.

Soils-- Deep (> 300 cm) rapidly drained Podzols (Uc2.21, Uc2.32)

Limitations-- High erodibility, high permeability, strongly acid, low fertility and very low available water-holding capacity, non cohesive soils, high wind erosion risk, localised steep slopes.

kr *KOROGORO*

Landscape-- Pleistocene barrier dunes and low transgressive dunes with extremely low relief of 1 - 9 m (usually < 3 m), low elevation (< 10 m) and slopes of < 5%. Low open forest, uncleared.

Soils-- Deep (> 300 cm) Podzols (Uc2.32, Uc4.23) and Siliceous Sands (Uc2.2) on rises rapidly drained to a water table deeper than 100 cm. Deep (> 300 cm) imperfectly drained Humus Podzols (Uc5.11) in swales.

Limitations-- High erodibility, high permeability, strongly acid, low fertility and very low available water-holding capacity, non cohesive soil materials, high wind erosion risk.

lf *LONG FLAT*

Landscape-- Open depressions and undulating to rolling narrow plains forming the inset modern floodplain to most streams. Local relief is usually < 3 m and elevations range from 3 m downstream to 20 m upstream. Holocene stratified fluvial sands loams and gravels. Mainly cleared, remnants of riverine associations.

Soils— Deep (>300 cm) well drained Alluvial Soils ranging from uniform sands (Uc1.23) and loams (Um1.23, Um5.52, Um6.23) to gradational profiles (Gn2.41, Gn4.13, Gn4.31).

Limitations— Flooding hazard, streambank erosion, low wet strength soils.

li *LIMEBURNERS*

Landscape— Level to gently undulating sandplain and barrier beach ridges formed on Pleistocene sands. Slope 0 - 5%. Elevation and relief ranges from 2 - 6 m. Low woodland and dry heath on sandplains and low wet heath in swales, 50% cleared.

Soils— Deep (>300 cm) Podzols (Uc4.24, Uc2.36) that are rapidly drained to a fresh water table at about 100 cm.

Limitations— High erodibility, high permeability, strongly acid, low fertility and very low available water-holding capacity, non cohesive soils, shallow water tables.

mr *MARIA RIVER*

Landscape— Extensive level plains, floodplains and backswamps on Holocene alluvium in the lower reaches of the major streams. Relief < 1 m, elevation 1 - 3 m. Swamp species often cleared for grazing.

Soils— Various alluvial clays forming moderately deep (100 - 150 cm) Humic Gleys (Uf6.61, Uf6.62, Uf6.13,), and grey and yellow duplex soils (Dy2.21, Dy5.11). These overlie buried Pleistocene barrier sands or Holocene estuarine sediments.

Limitations— Regular flooding hazard, waterlogging, foundation hazards, strongly acid, sodic soils, low wet bearing strength, low permeability, organic soils (localised), salinity (localised), acid sulphate soils (localised).

Landscape Variant - mrw — A wetter variant similar to **ck** occurs in swampy depressions.

mm *MARLO MERRICAN*

Landscape— Footslopes, fans, and pediments forming the lower slopes of valleys developed in mudstones. Slopes are long and range from 1 - 5%, elevations average 20 - 50 m, cross valley relief on fans is < 5 m, on footslopes < 40 m. Tall open wet and dry sclerophyll forest partially cleared for grazing.

Soils— Deep (> 300 cm) moderately well drained gravelly Krasnozems (Gn4.11) and Brown Podzolic Soils (Db1.11) occur on alluvial fans. Shallow (< 50 cm) imperfectly drained Soloths (Db1.21) occur on upper footslopes with moderately deep (> 70 cm) Chocolate Soils (Db3.11, Db3.21) on lower gentler grade footslopes

Limitations— Seasonal waterlogging and gully erosion hazard. Localised run-on and flooding hazard. Foundation hazards due to plastic clay soils with low permeability, moderate shrink - swell potential, very strongly acid with high aluminium toxicity potential.

pc *PIPERS CREEK*

Landscape— Level alluvial terraces to streams draining mudstones. Developed on Late Pleistocene alluvium. Slopes <1%, relief <1 m, elevation 5 - 9 m. Tall open dry sclerophyll forest, partially cleared.

Soils— Deep (> 300 cm) sodic brown Soloths (Db3.41, Dy3.41, Db1.41) and Yellow Podzolic Soils (Dy2.21).

Limitations— Flooding hazard, seasonal waterlogging, strongly sodic, hardsetting, low wet bearing strength, very strongly acid, moderate erodibility, dispersible, low fertility, high aluminium toxicity potential.

rb *REDBANK*

Landscape— Residual undulating rises forming high level terrace surfaces usually on Tertiary alluvium. Slopes are usually 0 - 10%, elevations 30 - 50 m. No surface drainage channels. Tall open dry sclerophyll forest, mostly cleared.

Soils— Deep (>300 cm), well drained Krasnozems (Gn3.11, Um6.33, Red Podzolic Soils (Dr2.11) and Red Earths (Um4.21).

Limitations— Only minor limitations to agricultural and urban use, foundation hazards, strongly acid low fertility subsoils.

rf *ROCKS FERRY*

Landscape– Low undulating rises and swales on the floodplain of the upper estuarine reaches of the Hastings River. Elevations range from 3 - 10 m ahd and relief < 4 m. Completely cleared for fodder cropping, and grazing.

Soils– Deep (>300 cm) moderately well drained Euchrozems (Uf6.31), and Alluvial Soils. Other soils include Gn2.81, Gn4.81 and Uf5.12.

Limitations– Flooding hazard (localised), plastic soils, low wet strength

rh *RED HILL*

Landscape– Dissected residual Tertiary basalt plateau surface of 200 m elevation and local relief of up to 80 m. Broad crests with slopes < 10%. Wet sclerophyll forest and rainforest, cleared for cultivation.

Soils– Dominantly deep (> 300 cm) well drained Krasnozems (Gn3.11) on midslopes with Chernozems (Um6.13) on crests and Red Podzolic Soils (Dr4.11) on lower slopes.

Limitations– Erosion associated with cultivation, strongly acid low fertility subsoils, localised mass movement hazard.

th *THRUMSTER*

Landscape– Undulating and rolling rises of 30 - 60 m elevation and local relief of < 60 m. Broad crests and sideslopes < 15%. Tall open dry sclerophyll forest with rainforest in protected gullies. Extensively cleared and cultivated in the past now substantially urbanised.

Soils– Deep (>300 cm) well drained Krasnozems (Gn3.11, Gn4.11, Um6.33, Uf5.21) and Euchrozems (Uf6.31). Some Laterites on crests.

Limitations– Deep regolith, moderately reactive subsoils, erosion hazard, low wet bearing strength, high permeability, strongly acid, aluminium toxicity hazard, low subsoil fertility.

Landscape Variant - ths – Steeper slopes of erosional terrain are mapped as slope variant **ths.**

to *TORRENS*

Landscape– Level sandplain of extremely low relief (<1 m) and low elevation (1 - 2 m) with seasonally high watertables. Formed on Pleistocene backbarrier muddy sands. Distinctive low wet heath, partially cleared for grazing.

Soils– Deep (> 300 cm) Yellow Podzolic Soils (Dy4.51), Yellow Earths (Gn1.21), and soils similar to Podzols (Uc2.3).

Limitations– Localised flooding, seasonal waterlogging, low fertility, very strongly acid, high aluminium toxicity potential, and low available water-holding capacity.

xx *DISTURBED TERRAIN*

Landscape– Level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Local relief and slopes vary considerably. Landfill includes soil, rock, building and waste materials. Includes sand mining areas, quarries, tips, land reclamation and large cut and fill features. Original vegetation completely cleared.

Soils– Disturbed and highly variable soil materials.

Limitations– Highly variable depending on site conditions. Limitations may include foundation hazard, unconsolidated low bearing strength materials, impermeable soils, poor drainage, very low fertility, toxic materials and wind erosion hazard. Sources of sediment and groundwater contamination.

2.4 SOIL LANDSCAPES OF THE CAMDEN HAVEN 1:100 000 SHEET

ba *BURRAWAN*

Landscape: Undulating low hills with broad crests and drainage depressions, on lithic sandstones and conglomerates of the Lorne Basin (Rec). Local relief 10-30m, elevation 10-50m, slopes 5-10%. Tall open forests, partly cleared for grazing on native pastures, and some residential development.

Soils: 50-200cm, well drained Red or Brown Kurosols (red podzolic soils) on crests, with >200cm imperfectly drained Red Kandosols on flats.

Significant Soil and Land Qualities: Strongly acidic, sodic, erodible soils. Hardsetting surfaces, low wet bearing strength, high run-on, seasonal waterlogging, gully erosion hazard, low fertility.

bb *BYABARRA*

Landscape: Rolling hills, on lithic sandstones, mudstones and siltstones of the Byabarra beds (Cb). Local relief 50-100m, elevation 50-200m, slopes 10-33%. Open forests, partly cleared for grazing on native pastures.

Soils: 50-100cm moderately well drained Brown Kurosols (red podzolic soils) and Brown Kandosols (yellow earths), with <70cm Leptic Tenosols (lithosols) on ridges.

Significant Soil and Land Qualities: Strongly acidic, erodible, locally shallow, stony soils, low water holding capacity. Hardsetting surfaces, low wet bearing strength, water erosion hazards.

be *BELBORA*

Landscape: Rolling low hills on Bundook beds (Dlb), with moderately broad crests, moderately inclined convex slopes steepening into narrow concave lower slopes & drainage lines. Local relief 30-100m, elevation 10-100m, slopes 10-33%. Open forests, partly cleared for grazing on native pastures.

Soils: <70cm moderately well drained Leptic Tenosols (lithosols) and Brown Kurosols (red podzolic soils) on crests & slopes, and Brown Sodosols (soloths) on lower slopes & drainage lines.

Significant Soil and Land Qualities: Strongly acidic, erodible, locally shallow soils, low water holding capacity. Water erosion hazards.

bt *BROTHERS*

Landscape: Steep to precipitous hills, on granite and rhyolite (Rlv, Rbg). Local relief 100m to 300m, elevation 20m to >400m, slopes 33-50%, rising to >100% on precipitous cliffs and plugs. Mostly uncleared open (dry sclerophyll) forest.

Soils: Large areas of bare rock on cliff faces, with <50cm Leptic Tenosols (lithosols) on steep slopes, and 100-180cm well-drained Red Dermosols and Red Chromosols (red podzolic soils) on sideslopes and lower slopes.

Significant Soil and Soil Qualities: Highly erodible, shallow, acidic, sodic, sandy, hardsetting soils of low fertility and low water-holding capacity. Rock outcrop; high erosion and mass movement hazards.

cb *CROWDY BAY*

Landscape: Pleistocene barrier dunes and low transgressive dunes and swales. Relief 1-9m (usually <3m), elevation <10m, slopes <5%. Low open forest, uncleared.

Soils: >300cm Aeric Podosols (podzols) on rises, rapidly drained to a water table >100cm; >300cm imperfectly drained Semiaquic Podosols (humus podzols) in swales.

Significant Soil and Land Qualities: High erodibility, high permeability, low fertility and very low available water-
holding capacity, non cohesive soil materials, high wind erosion risk.

cn *COWANS LANE*

Landscape: Broad remnant alluvial terraces, on Late Pleistocene alluvium in protected coastal locations. Slopes <1%, relief <1m, elevation <10m. Open dry sclerophyll forest, partially cleared for grazing on native pastures.

Soils: >300cm imperfectly- to poorly-drained Brown Sodosols (soloths) and Brown or Yellow Kurosols (yellow podzolic soils) on shallow alluvium, and very deep Black or Brown Vertosols (black earths and prairie soils) on deep alluvium.

Significant Soil and Land Qualities: Strongly sodic, hardsetting, low wet bearing strength, strongly acid, low fertility, high aluminium toxicity potential. Localised flooding hazard, seasonal waterlogging.

Landscape Variant - cna: Freshwater alluvial backswamps.

cr *CRAWFORDS RIVER*

Landscape: Broad remnant alluvial terraces with incised floodplains, on Late Pleistocene alluvium in protected coastal locations in the south. Slopes <1%, relief <1m, elevation <10m. Open dry sclerophyll forest, partially cleared for grazing on native pastures.

Soils: >300cm imperfectly- to poorly-drained Brown Sodosols (soloths) and Brown or Yellow Kurosols (yellow podzolic soils) on terraces, and very deep Black or Brown Vertosols (black earths and prairie soils) on floodplains.

Significant Soil and Land Qualities: Strongly sodic, hardsetting, low wet bearing strength, strongly acid, low fertility, high aluminium toxicity potential. Localised flooding hazard, seasonal waterlogging.

dc *DIRTY CORNER*

Landscape: Level backbarrier sandplain swamps and floodbasins over Pleistocene muddy sands. Very low elevation and relief. Swamp sclerophyll forests (partly cleared for grazing), sedgelands, wet heath and saltmarsh.

Soils: Moderately deep (50-100 cm) poorly drained Hydrosols (humic gleys), Grey Chromosols (gleyed podzolic soils) and Aquic Podosols (groundwater podzols), all overlying estuarine clayey sands.

Significant Soil and Land Qualities: Low wet bearing strength, acidity, localised salinity, very low water-holding capacity, acid sulphate soils, non cohesive soils; shallow water tables, waterlogging, flooding.

fa *FACTORY ROAD*

Landscape: Undulating to rolling rises, on indurated alluvial sands and gravels of late Tertiary age (Ts). Local relief 10-30m, elevation 5-30m, slopes 10-25%. Tall open (dry sclerophyll) forest, sometimes partly cleared for grazing and housing development.

Soils: 60-100cm imperfectly drained gravelly Brown Kurosols (red podzolic soils and soloths) and <40cm imperfectly drained sandy Paralithic Tenosols (lithosols).

Significant Soil and Land Qualities: Strongly acidic, erodible, locally shallow, gravelly soils. Water erosion hazards, low wet bearing strength.

fr *FAILFORD ROAD*

Landscape: Gentle to undulating rises with broad crests and narrow drainage lines, on Bundook Beds (Dlb). Local relief 10-30m, elevation 10-50m, slopes <10%. Tall open forests, partly cleared for grazing on native pastures.

Soils: 100-200cm, well drained Red or Brown Kurosols (red podzolic soils) on crests, with imperfectly drained Sodosols on lower slopes and in drainage lines.

Significant Soil and Land Qualities: Strongly acidic, sodic, erodible soils. Hardsetting surfaces, low wet bearing strength, high run-on, seasonal waterlogging, gully erosion hazard, low fertility.

gh *GRANTS HEAD*

Landscape: Rolling low hills and hills on sandstones and conglomerates of the Lorne Basin (Rec). Local relief 50-300m, elevation <500m, slopes 15-33%. Open forests, partly cleared for grazing on native pastures, and some residential development.

Soils: 50-100cm moderately well drained stony Brown Kurosols (red podzolic soils), with occasional <70cm Leptic Tenosols (lithosols) on upper slopes.

Significant Soil and Land Qualities: Strongly acidic, erodible, locally shallow, stony soils, low water holding capacity. Hardsetting surfaces, low wet bearing strength, water erosion hazards.

Landscape Variant - gha: Colluvial fans and footslopes.

gr *GREAT SWAMP*

Landscape: Level back-barrier sandplain swamps, formed on Pleistocene barrier sands. Elevation 1-3m. Various sedgeland associations and wet heath.

Soils: >300cm poorly drained Organosols (acid peats) and Aquic Podosols (humus podzols).

Significant Soil and Land Qualities: High water tables, ponded water, very low wet bearing strength. High erodibility, high permeability, highly organic and non cohesive soils.

he *HERONS CREEK*

Landscape: Narrow to moderately broad floodplain and low terrace surfaces, with minor depressions and drainage lines and narrow braided channel, in mid to upper reaches of streams draining the Lorne Basin. Local relief <10m, elevation <100m, slopes <5% (up to 50% on banks). Extensively cleared riverine forests.

Soils: >300cm moderately well drained Brown Kandosols (brown earths and prairie soils) and Red Kandosols (red earths) and 50-200cm well drained gravelly Stratic Rudosols (alluvial soils).

Significant Soil and Land Qualities: Highly erodible, well drained, acid, gravelly soils, low available water holding capacity. Stream bank erosion, high run-on, foundation hazard, localised flood hazard, localised seasonal waterlogging.

hm *HOUSTON MITCHELL*

Landscape: Undulating to rolling low hills on fault zone complexes (Ps, Pd, Pet, Pew), with moderately broad crests, and moderately inclined convex slopes. Local relief 30-90m, elevation 10-100m, slopes 10-25%. Uncleared low open forests (dry sclerophyll forests).

Soils: 50-100cm well drained Brown Kurosols (brown podzolic soils).

Significant Soil and Land Qualities: Strongly acidic, aluminium and other toxicities, erodible, locally shallow soils, low water holding capacity, infertile. Water erosion hazards.

ho *HOLEY FLAT*

Landscape: Undulating low hills on granite and rhyolite (Rlv, Rbg). Local relief 20-90m, elevation 40-200m, slopes 5% to 20% (generally <10%). Open dry sclerophyll forest and tall open forest, partly cleared.

Soils: 100-180cm, moderately well-drained Red Kurosols (red podzolic soils) on crests, with poorly drained Yellow Chromosols (yellow podzolic soils) in areas of poor drainage.

Significant Soil and Land Qualities: Highly erodible, acidic, hardsetting soils of low fertility and low water-holding capacity.

hv *HANNAM VALE ROAD*

Landscape: Rolling low hills and hills on granite and rhyolite (Rlv, Rbg). Local relief 40-200m, elevation 40-200m, slopes 15-33%. Open dry sclerophyll forest and tall open forest, partly cleared.

Soils: 100-180cm, moderately well-drained Red and Brown Kurosols (red podzolic soils).

Significant Soil and Land Qualities: Strongly acidic, erodible, stony soils, low water holding capacity. Water erosion hazards.

ji *JONES ISLAND*

Landscape: Level fluvial-deltaic floodplains with minor backswamps and flood basins. Local relief <3m, elevation <10m, slopes <2%. Wet meadow and sedgeland with open swamp sclerophyll forests.

Soils: >200cm poorly-drained Redoxic and Oxyaquic Hydrosols (humic gleys).

Significant Soil and Land Qualities: Low wet-bearing strength, acid sulfate soil hazard. Localised flood hazard, localised seasonal waterlogging.

jn *JOLLY NOSE*

Landscape: Steep to very steep hills, upper slopes and escarpments with narrow crests, and occasional colluvial footslopes, on sandstones and conglomerates of the Lorne Basin (Rec). Both local relief and elevation 50-300m, slopes 33-60% with some precipitous cliffs. Tall open dry sclerophyll forests.

Soils: <80cm imperfectly drained Leptic Tenosols and Yellow Kandosols, with bare rock on cliff faces.

Significant Soil and Land Qualities: Steep slopes, high erosion hazards, mass movement hazards. Stony, shallow soils, hardsetting surfaces, low plant-available water capacity, low fertility.
Landscape Variant - jna: Precipitous cliff faces, with slope gradients 60% to near vertical.

ky *KYLIES*

Landscape: Low Pleistocene inner-barrier beach-ridge plain. Local relief 1-9m (usually <3m), elevation <10m, slopes <5%. Low open forest, cleared in places for sand mining and pastures.

Soils: >300cm rapidly drained Aeric Podosols(podzols) on rises and >300cm imperfectly drained Semiaquic and Aquic Podosols (humus podzols) in swales, over deep water tables.

Significant Soil and Land Qualities: Highly erodible, highly permeable, rapidly drained, highly infertile, non cohesive soils, with very low available water-holding capacity. High wind erosion risk.

la *LAURIETON*

Landscape: Undulating low foothills, scree slopes and fans derived from granite (Rbg), below steep hills. Local relief 10-50m, elevation <80m, slopes 5-20%, generally <10%. Open dry sclerophyll forest and tall open forest, partly cleared for pasture.

Soils: <80cm, moderately well-drained sandy Leptic Tenosols (lithosols) and Red Dermosols (red podzolic soils); 90-180cm poorly drained Yellow Chromosols (yellow podzolic soils) in areas of poor drainage.

Significant Soil and Land Qualities: Acidic, stony, hardsetting soils of low fertility and low water-holding capacity. Very high run-on.

lu *LAUREL LANE*

Landscape: Undulating rises and low hills on lower slopes to South Brother, on siltstones of the Manning Group (Pem). Local relief 10-150m, elevation 40-200m, slopes 10-25%, occasionally to 33%. Rainforest and tall open forests, often cleared for grazing and horticulture.

Soils: 100-200cm well-drained silty-textured Red Chromosols (red podzolic soils) and Red Dermosols (kraznozems).

Significant Soil and Land Qualities: Erodible, stony, acidic soils of moderate to high fertility. High run-on, significant gully and rill erosion.

me *MELINGA*

Landscape: Undulating rises and low hills, on lithic mudstones and lithic sandstones of the Byabarra Beds (Cb). Local.relief 10-30m, elevation 10-50m, slopes 5-10%. Open forests, partly cleared for grazing.

Soils: 100-150cm, poorly drained Mottled Natric Brown or Yellow Kurosols (soloths and yellow podzolic soils).

Significant Soil and Land Qualities: Strongly acidic, sodic, erodible soils. Hardsetting surfaces, low wet bearing strength, high run-on, seasonal waterlogging, gully erosion hazard.

ml *MOORLANDS*

Landscape: Gentle to undulating residual alluvial terraces and re-worked fans, of Tertiary age. Local relief 10-30m, elevation 10-40m, slopes 3-15%. Tall open forests and subtropical rainforest, extensively cleared for grazing, cultivation and horticulture.

Soils: 200-300cm well drained Red Dermosols (kraznozems).

Significant Soil and Land Qualities: Deep acidic soils, high permeability, aluminium toxicity hazard. Moderate rill erosion hazard, otherwise high agricultural and horticultural suitability.

mt *MOUNT TALAWAHL*

Landscape: Steep to very steep hills with narrow crests, steep slopes and occasional colluvial footslopes, on the Bundook Beds (Dlb). Local relief 90-300m, elevation 10-300m, slopes 33-60%. Tall open forests, uncleared.

Soils: <80cm imperfectly drained Leptic Tenosols and Yellow Kandosols, with bare rock on cliff faces.

Significant Soil and Land Qualities: Steep slopes, high erosion hazards, mass movement hazards. Stony, shallow soils, hardsetting surfaces, low plant-available water capacity, low fertility.

pb *PELICAN BAY*

Landscape: Level intertidal and supratidal swamps on Holocene sands and muds. Elevation 0-2m. Mangroves, saltmarsh, swamp sclerophyll forests.

Soils: Sulphidic Intertidal and Supratidal Hydrosols (humic gleys and solonckaks).

Significant Soil and Land Qualities: High ASS risk; low fertility and very low available water-holding capacity, non cohesive soils, shallow water tables.

pi *PIPECLAY CANAL*

Landscape: Level estuarine backswamps and floodbasins. Local relief <1m, elevation <5m. Often extensively drained. Wet meadow and sedgelands with open swamp sclerophyll forests.

Soils: >200cm poorly-drained Sulphidic Hydrosols (humic gleys) and Sulphidic Organosols (acid peats).

Significant Soil and Land Qualities: Strongly to extremely acid, sodic, saline soils with high aluminium toxicity potential, high organic matter, low to very low wet bearing strength and slow subsoil permeability. Flood hazard, permanently high watertables, high foundation hazard, very high acid sulfate soil hazard.

pn *PRINCES*

Landscape: Narrow, often slightly convex alluvial fans on footslopes, grading to broad drainage plains, below hills of the Lorne Basin (Rec). Slopes <3%, local relief <2m, elevation 5-20m. Open dry sclerophyll and swamp forest, often partly cleared for grazing.

Soils: Very deep (>300cm), poorly drained, Mottled Brown or Grey Sodosols (solods) and Kurosols (gleyed podzolic soils).

Significant Soil and Land Qualities: Sodic, hardsetting soils, very low permeability, high erodibility, low wet bearing strength. Acidic, high aluminium toxicity potential, low fertility. High run-on, localised flood hazard, waterlogging, foundation hazards.

sh *SHINGLERS CREEK*

Landscape: Narrow, often slightly convex alluvial fans on footslopes, grading to broad drainage plains, below hills of the Bundook Beds (Dlb). Slopes 2-5%, local relief and elevation <20m. Open dry sclerophyll and swamp forest, often partly cleared for grazing.

Soils: Very deep (>200cm), moderately to poorly drained, Mottled Brown or Grey Sodosols (soloths).

Significant Soil and Land Qualities: Sodic, hardsetting soils, very low permeability, high erodibility, low wet bearing strength. Acidic, high aluminium toxicity potential, low fertility. High run-on, localised flood hazard, waterlogging, foundation hazards.

th *THRUMSTER*

Landscape: Undulating and rolling rises & low hills with broad crests. Elevation 30-60m, local relief <60m, slopes <15%. Tall open forest with rainforest in protected gullies, extensively cleared.

Soils: >300 cm well drained Red Ferrosols (krasnozems) and Brown Ferrosols (euchrozems). Deep regolith, some laterites on crests.

Significant Soil and Land Qualities: Deep strongly acidic soils, low wet bearing strength, high permeability, aluminium toxicity hazard, low subsoil fertility. Moderately reactive subsoils, rill erosion hazard.

up *UPSALLS CREEK*

Landscape: Level elevated terrace surfaces on Early Pleistocene alluvium, in mid to upper reaches of streams draining the Lorne Basin. Slopes <5%, elevation 20-80m, local relief up to 3m. Open forests, mostly cleared for improved pastures.

Soils: 100-180cm imperfectly drained Brown Kurosols (red podzolic soils) and Brown Kandosols (yellow earths) overlying mottled alluvial loams.

Significant Soil and Land Qualities: Hardsetting, low fertility, acidic soils. Poor drainage, seasonal waterlogging, moderate foundation hazards, run on (localised).

wa *WATSON TAYLORS*

Landscape: Levees of fluvial-deltaic plains. Local relief <3m, elevation <8m, slopes <2% on backplains and upper surfaces, to 15% on side-slopes. Open forest and subtropical rainforest, mostly cleared for improved pasture, with gallery mangroves.

Soils: >300cm well drained Brown Kandosols (alluvial soils, chernozems, gradational yellow earths).

Significant Soil and Land Qualities: Low wet-bearing strength. High streambank erosion hazard, localised seasonal waterlogging, prime agricultural land.

xx *DISTURBED*

Landscape: Level to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Variable local relief and slopes. Includes quarries, tips, land reclamation and large cut and fill features. Original vegetation cleared, and weeds may be abundant.

Soils: Original soil has been removed, greatly disturbed or buried. Landfill includes soil, rock, building and waste materials.

Significant Soil and Land Qualities: Highly variable; may include foundation hazard, unconsolidated low bearing strength materials, impermeable soils, poor drainage, very low fertility, toxic materials and wind erosion hazard. Sources of sediment and groundwater contamination.

2.5 SOIL LANDSCAPES OF THE BULAHDELAH 1:100 000 SHEET

am *ALUM MOUNTAIN*

Landscape--steep strike ridge on the Permian Alum Mountain Volcanics. Slopes generally 20 - 50%, local relief 50 - 70 m elevation 10 to 70 m. Crests narrow rocky and peaked, slopes are steep and often cobble strewn and drainage lines are numerous and narrow. A gentle broad saddle is present.

Soils--shallow (<50 cm) Lithosols/Yellow Podzolic Soils (Dy4.81) on slopes with moderately deep (100 - 200 cm) imperfectly drained Yellow Podzolic Soils (Dy4.11) on the gentle saddle.

Limitations--includes extreme erosion hazard, steep slopes, high foundation hazard, shallow stony soils of low fertility, localised rock fall and localised rock and boulder outcrop.

ar *AVALON ROAD*

Landscape-undulating rises to rolling low hills on sandstones and mudstones of the Wallanbah Formation. Slope gradients generally 10 -20 %. Local relief 20 - 70 m. Convex moderately broad crests, gently to moderately inclined sideslopes grading into convex lower slopes and narrow drainage plains. Rock outcrop is rare.

Soils - shallow (<50 cm) well drained- Lithosols are dominant on steeper slopes and narrow crests with occasional moderately deep (50 - 100 cm) well drained Red Podzolic Soils on broader crests and upper slopes with shallow (< 50 cm) well drained Red Podzolic Soils or Yellow Podzolic soils on slopes grading into deep (>100 cm) Soloths on footslopes and drainage lines.

Limitations - moderate to high water erosion risk , shallow stony soils (localised), sodic subsoils on footslopes and drainage plains , acid often hardsetting soils of low fertility,

bd *BULAHDELAH*

Landscape - gently undulating to undulating rises on the Permian Bulahdelah Formation. Slope gradients < 10%. Elevation < 50 m, Local relief 10 - 30 m. Broad crests, gently inclined slopes and narrow drainage lines and drainage flats.

Soils - Sandstones: shallow (< 50 cm) well drained Lithosols on steeper crests and slopes and well drained Yellow Podzolic Soils on slopes. Mudstone/Siltstone soil Katena with moderately deep to deep (75 - 200 cm) Red, Brown and Yellow Podzolic Soils.. Iimperfectly drained deep (> 150 cm) Soloths on lower slopes and drainage lines.

Limitations.- acid soils, high soil erosion risk (localised).

Landscape Variant - bda - rolling low hills slopes 10 - 20 % classified uner Erosional Landscapes. Limitations include high soil erosion risk, hardsetting acid soils of poor fertility, localised shallow soils.

be *BELBORA*

Landscape - rolling low hills on Bundook beds. Slope gradients 10 - 30%, local relief 30 - 90 m, elevation 10 -230 m. Moderately broad crest, moderately inclined convex slopes steepening into narrow concave lower slopes and drainage lines.

Soils - shallow (< 50 cm) Lithosols and red Podzolic Soils on crests and upper slopes and shallow (< 50 cm) Lithosols and Brown and Yellow Podzolic Soils on slopes with moderately deep to deep imperfectly drained to poorly drained Soloths on lower slopes and drainage lines.

Limitations - shallow acid soils, high erosion risk

bn *BREAK NECK HILL*

Landscape - steep to very steep hills on undifferentiated Permian Sediments. Slope gradients > 30%. Local relief 90 - 150 m. Elevation 100 - 240 m. Narrow crests, steeply inclined slopes with numerous narrow incised drainage lines. Some scree slopes occur with abundant boulders and cobbles.

Soils - shallow (<50 cm) well drained Lithosols and shallow to moderately deep (<100 cm) Red, Brown and Yellow Podzolic Soils. Red Podzolic Soil/Kraznozem intergrade occurs on weathered Colluvial scree.

Limitations include Mass movement risk, steep slopes, foundation hazard, localised shallow stony soils, acid soils.

br *BURRADUC*

Landscape - rolling low hills on sediments of the Boolambayte Formation . Slope gradients generally 10 - 25%. Local Relief 20 - 40m. Generally narrow to moderately broad convex crests with moderately inclined slopes and narrow drainage lines.

Soils - shallow (< 50 cm) well drained Lithosols on siltstone crests with Moderately deep (50 - 100 cm) well drained Yellow Earths on sandstone crests and slopes: shallow to moderately deep ((<100 cm) well drained Red, Brown and Yellow Podzolic Soils catena with decreasing drainage on siltstone slopes and moderately deep to deep > 50 cm imperfectly to poorly drained Soloths on lower slopes and drainage lines.

Limitations - shallow soils (localised), acid soils with low to moderate fertility, moderate to high erosion risk.

Landscape Variant - bra - Undulating rises with broad crests and long slopes on Boolambayte Formation. Moderately deep to deep moderately well drained Yellow Podzolic Soils on crests and upper slopes and imperfectly to poorly drained Soloths on lower slopes. Limitations include acid, hardsetting soils which slake readily on exposure, sodic soils on lower slopes.

bu *BUNYAH*

Landscape - undulating rises to rolling low hills on Wang Wauk Beds. Slope gradients < 30%, local relief 10 -90 m, elevation 30 - 130 m. Narrow to moderately broad crest moderately inclined convex slopes and gently inclined narrow footslopes.

Soils - moderately deep (50 -100 cm) Red Podzolic Soils, Brown Podzolic Soils and Yellow Podzolic soils on crests and slopes, minor well drained shallow (< 50 cm) Lithosols on steeper slopes, and imperfectly drained deep (>100 cm) Soloths on lower slopes and drainage lines.

Limitations - Localised shallow soils, high erosion risk, hardsetting acid soils, localised sodic dispersible soils.

cib *COCKATOO ISLAND*

Landscape Variant - cib - veneer of Holocene estuarine tidal flat overlying Pleistocene estuarine clay .Saline Solonchaks. Limitations tidal inundation, saline soils, localised potential acid sulphate soils, foundation hazard, very poor fertility.

cl *CLARENDON*

Landscape - rolling low hills on undifferentiated Permian sediments. Slope gradients < 30%, local relief 10 - 90 m, elevation 30 - 125 m. Narrow to moderately broad crests with moderately inclined slopes and gently inclined narrow footslopes.

Soils - moderately deep to deep (>50cm) well drained Red, Brown and Yellow Podzolic Soils and imperfectly drained Soloths in drainage lines. Minor shallow (<50 cm) well drained Lithosols

Limitations - moderate to high erosion risk, high run-on (localised), highly erodible soils (localised), acid soils.

Landscape Variant cla - undulating rises with slope gradients < 10% on undifferentiated Permian Sediments. Classified under residual landscapes. Moderately deep well drained Brown Podzolic soils on crests and upper slopes and Soloths on lower slopes. Limitations include localised shallow soils, high erosion risk, hardsetting acid soils, localised sodic dispersible soils.

cm *CABBAGE TREE MOUNTAIN*

Landscape - steep hills on sandstones, conglomerates and minor siltstones of the McInnes Formation. Slope gradients > 25%. Local relief 70 - 350 m. Narrow crests and ridges, steep sideslopes and narrow incised drainage lines. Uneven surface with many cobbles and stones and often boulders.

Soils - shallow (< 50 cm) Lithosols and shallow imperfectly drained Soloths

Limitations - very high erosion risk, steep slopes, rock fall hazard (localised), shallow stony soils with very low fertility.

Landscape Variant -cma - Rolling low hills on sandstones of the McInnes Formation, slopes < 25%. Well drained shallow (<50 cm) Lithosols and shallow to moderately deep (40 - 150 cm) imperfectly drained Soloths. Limitations include high erosion hazard, hardsetting acid soils of poor fertility.

co *COOMBA*

Landscape - rolling low hills on Yagon Siltstone and undifferentiated Yagon Siltstone and Booti Booti Sandstone. Slope gradients < 30%. Local relief 20 - 50 m. narrow to moderately broad convex crests, moderately inclined slopes and narrow concave footslopes and drainage lines.

Soils - shallow (< 50 cm) well drained Lithosols on crests and steeper slopes with well drained shallow to moderately deep (<100 cm) Red and Yellow Podzolic Soils on more gently inclined slopes and deep (>100 cm) Soloths on lower slopes and drainage lines.

Limitations - shallow soils (localised) hardsetting acid soils, sodic soils (localised) high erosion hazard.

cr *CRAWFORD RIVER*

Landscape broad terraces with narrow, incised, active floodplains. Slope Gradients < 1%. Local Relief < 10 m. Active flood channels and narrow levees, scrolls and backswamps.

Landscape Variant - cra - where possible Active floodplain has been mapped. Limitations include frequent flooding, foundation hazard.

Soils giant (> 5 m) imperfectly to poorly drained Soloths on terraces with well drained deep (> 150 cm) Alluvial Soils and Prairie Soils on active floodplain.

Limitations - Localised flooding and high run-on, seasonal waterlogging, localised waterlogging, impermeable, sodic, highly erodible, acid hardsetting soils of low soil fertility.

ct *COOLONGOLOOK TRIG*

Landscape - steep to very steep hills on Wang Wauk Beds. Slope gradients 30 -60%. Local Relief 90 - 300 m. Elevation 10 - 424 m. Narrow often sandstone capped crest and steeply inclined slopes with boulders in upper parts and narrow incised drainage lines.

Soils - shallow (< 50 cm) well drained Lithosols with stony Yellow Earths on weathered sandstone colluvium.

Limitations- include Mass movement risk, steep slopes, Very high erosion hazard, foundation hazard, shallow stony acid soils of poor fertility.

ec *EMU CREEK*

Landscape - rolling to steep hills on sediments of the Booral Formation. Slope gradients > 15 - 40%. Local Relief 90 - >300 m. Narrow often sandstone capped crest and steeply inclined slopes with boulders in upper parts and narrow incised drainage lines.

Soils - shallow (< 50 cm) well drained Lithosols and minor, moderately deep (50 - 100 cm), well drained Yellow Pozolic Soils.

Limitations- mass movement risk (localised), steep slopes, very high erosion hazard, foundation hazard, shallow stony acid soils of poor fertility.

Landscape Variant - eca - rolling low hills with slopes < 20 % . Classified under erosional landscapes. .Limitations include high erosion risk, hardsetting, acid, soils with poor fertility.

fo *FORSTER*

Landscape - Rolling low hills on Booti Booti Sandstone. Slope gradients < 30%, local relief 10 - 40 m , elevation < 50 m. Narrow to moderately broad convex crests with moderately inclined convex slopes and gently inclined concave footslopes.

Soils - shallow (< 50cm) well drained Lithosols occur on steeper slopes, moderately deep (50 - 100 cm) well drained Yellow and Brown Podzolic Soils and imperfectly drained Soloths occur on more gently inclined slopes and deep (>100 cm) poorly drained Soloths occur on footslopes and drainage lines.

Limitations - high erosion hazard, localised shallow soils, very hardsetting, acid, often sodic soils with poor fertility.

Landscape Variant - foa - Low undulating rises on Booti Booti Sandstone. Well drained Yellow Podzolic Soils and imperfectly drained Soloths. Limitations include acid hardsetting soils, sodic subsoils, highly erodible subsoils.

fr *FAILFORD ROAD*

Landscape - gently undulating to undulating rises on Bundook Beds. Slope gradients < 10%. Elevation < 50 m, Local relief 10 - 30 m. Broad crests, gently inclined slopes and narrow drainage lines.

Soils - Predominantly moderately deep to deep (> 100 cm) well drained Red, Brown and Yellow Podzolic Soils Katena with deep imperfectly drained Soloths on lower slopes and drainage lines.

Limitations.- acid soils, sodic imperfectly drained footslopes.

gc *GREY GUM CREEK*

Landscape--undulating plain and rises on McInnes Formation. Slope gradients < 5%. Local relief < 10 m. Elevation up to 20 m. Broad crests, relatively long gently inclined slopes and broad drainage plains. Rock outcrop is rare. Predominantly uncleared Angophora/Eucalypt woodland.

Soils--moderately deep to deep (>100 cm) poorly drained Soloths (Dy3.41) on rises with deep (>150 cm) very poorly drained No Suitable Group (Gn3.91) along drainage plains.

Limitations--seasonal waterlogging, water erosion hazard, high run-on, flood hazard (drainage plains), foundation hazard (drainage plains), acidic soils of low fertility.

gg *GAN GAN.*

Landscape - steep hills on ignimbrites of the Nerong Volcanics. Slope gradients > 25%, Local relief 100 - 200 m. Narrow often peaked crests, upper slopes often precipitous, steep boulder strewn and drainage lines are often narrow and incised.

Soils - shallow (< 50 cm) well drained Lithosols and minor shallow to moderately deep (< 100 cm) Soloths on slopes with deeper (> 100 cm) Soloths on footslopes.

Limitations- include Mass movement risk (localised), steep slopes, boulder outcrop (localised), very high erosion hazard, foundation hazard, shallow stony acid soils of poor fertility.

Landscape Variant - gga- steep colluvial footslopes with deep Sodic Soils. Limitations include steep slopes, high run-on, water ersoion hazard, foundation hazard.

kt *KOOLANOCK TRAIL*

Landscape - steep hills on sandstones and minor mudstones of the Koolanock Sandstone. Slope gradients > 25%, Local relief 50 - 150 m. Narrow crests, upper slopes with occasional rock outcrop, steep cobble strewn slopes occasionally with colluvial footslopes and narrow incised drainage lines.

Soils - shallow (< 50 cm) well drained Lithosols and minor moderately deep to deep (>50 cm) Red Podzolic Soils. Stony moderately deep to deep (50 - 150 cm) imperfectly drained Soloths occur on footslopes.

Limitations- include Mass movement risk (localised), steep slopes, boulder/rock outcrop (localised), very high erosion hazard, foundation hazard, stony, often shallow, acid soils of poor fertility.

mf *MYALL FOREST ROAD*

Landscape - undulating to rolling low hills on Koolanock Sandstone. Slope gradients < 30 %. Local relief 20 - 50 m. Narrow convex crest, moderately inclined slopes and narrow concave footslopes.

Soils - predominantly well drained shallow (<50 cm) Lithosols with imperfectly drained moderately deep to deep (>50 cm) Soloths on footslopes and drainage lines.

Limitations - stony shallow hardsetting acid soils of poor soil fertility, high erosion risk, sodic subsoils on footslopes.

Landscape Variant -mfa - undulating rises with slope gradients < 10% with broad crests gently inclined slopes and footslopes. Yellow Podzolic Soils with imperfectly drained Soloths in footslopes and drainage lines. Minor Red and Brown Podzolic soils on siltstone.

mh *MARKWELL HEIGHTS*

Landscape - steep to very steep hills on Muirs Creek Conglomerate.. Slope gradients > 30%, Local relief 90 - 300 m. Narrow rocky crests, shortoften hummocky steep slopes,and narrow incised drainage lines Boulders, cobbles and stones often cover the surface. Small benches often present.

Soils - shallow (< 50 cm) well drained Lithosols and minor moderately deep (50 - 100 cm) Yellow Podzolic Soils and Yellow Earths on footslopes.

Limitations- include mass movement risk (localised), steep slopes, very high erosion hazard, foundation hazard, rock or boulder outcrop, stony, often shallow, acid soils of poor fertility.

Landscape Variant - mha - rolling hills slopes < 20% classified under Erosional Landscapes.

mr *MYALL RIVER*

Landscape--floodplain on Quaternary alluvium of the Myall River (upper) above Bombah Broadwater. Elevation <3 m, slope gradients <2%. Broad floodplain of narrow, low levee banks, wide backswamp plain and includes infilled prior channels. Uncleared tall open-forest.

Soils--deep (>300 cm) well drained Prairie Soils (Gn3.91) on levees; deep (>300 cm) very poorly drained Acid Peat (O) on backswamp plain; deep (>300 cm) poorly drained Dark Podzolic Soils (Dd3.51) on infilled prior channel.

Limitations--flooding, foundation hazard, seasonal waterlogging, permanent waterlogging (localised), permanent high watertables, saline soils and potential acidic sulphate subsoils.

Landscape variant mra - levee deposits

Landscape variant mrb - backswamps with peaty waterlogged often with potential ASS close to surface

mt *MOUNT TALAWAHL*

Landscape - steep to very steep hills on Bundook Beds. Slope gradients > 30%, Local relief 90 - 300 m. Elevation 10 - 430 m. Narrow crests, steep slopes with occasional colluvial footslopes and fans and narrow incised drainage lines.

Soils - shallow (< 50 cm) well drained Lithosols and minor moderately deep (50 - 100 cm) Red, Brown or Yellow Podzolic Soils. Deeper (> 100 cm) well drained Red Podzolic Soils occur on highly weathered colluvium.

Limitations- include Mass movement risk (localised), steep slopes, very high erosion hazard, foundation hazard, stony, often shallow, acid soils of poor fertility.

my *MYERS RANGE*

Landscape - steep to very steep hills on a range of Carboniferous Sediments . Slope gradients > 30%, Local relief 90 - 300 m. Elevation 10 - 300 m. Narrow often sandstone capped crests, steep slopes often with sandstone cobble and stones and occasional narrow colluvial footslopes . Drainage lines are numerous narrow and incised.

Soils - generally shallow (< 50 cm) well drained Lithosols and minor shallow to moderately deep (< 100 cm) well drained Brown or Yellow Podzolic Soils. Deeper (> 100 cm) imperfectly drained Soloths occur on footslopes. Shallow (<50 cm) well drained Yellow Earths on occur on sandstone crests.

Limitations- include mass movement risk (localised), steep slopes, very high erosion hazard, foundation hazard, stony, often shallow, acid soils of poor fertility.

pp *POSSUM PIE ROAD*

Landscape - rolling hills on Darts Creek Mudstone. Slope gradients < 30%, local relief 10 - 40 m , elevation < 50 m. Narrow to moderately broad convex crests with moderately inclined convex slopes often steepening towards narrow concave footslopes.

Soils - shallow (< 50cm) well drained Lithosols and Red Podzolic Soils on narrow crests and upper slopes, with shallow well drained Lithosols and Yellow Podzolic soils on steeper slopes and moderately deep to deep (>100 cm) imperfectly drained Soloths on footslopes and drainage lines.

Limitations - high erosion hazard risk, localised steep slopes, shallow, often hardsetting acid soils, localised sodic and dispersible subsoils (lower slopes and drainage lines).

Landscape Variant - ppa - Low undulating rises on Darts Creek Mudstone. Moderately deep well drained Brown and Yellow Podzolic Soils with localised shallow Lithosols on steeper slopes and Soloths on lower slopes and drainage lines. Limitations include hardsetting acid soils, moderate erosion risk, sodic dispersible soils (lower slopes).

pr *PINDIMAR ROAD*

Landscape--undulating to rolling low hills on mudstones and minor interbeds of lithic sandstones of the Wootton Beds. Local relief 30 - 60 m. Slope gradients up to 25%. Broad crests, gently to moderately inclined slopes with incised upper slope drainage lines grading into broader lower slope drainage plains. Rock outcrop is rare. Cleared to partially cleared tall open-forest.

Soils--shallow to moderately deep (30 -70 cm) well drained Brown Podzolic Soils (Db2.21) and Yellow Podzolic Soils (Dy2.11, Dy2.21, Dy3.11, Dy3.21, Dy4.11) on sandstone parent material; moderately deep to deep (50 - 200 cm) moderately well drained Brown Podzolic Soils (Db1.21, Db2.21, and Yellow Podzolic Soil (Dy3.21 minor Dy2.11); moderately deep to deep (100 - 200 cm) imperfectly drained Soloths (Dy 3.41) in poorly drained areas.

Limitations--high erosion hazard, moderate foundation hazard, shallow soil (localised), seasonal waterlogging (localised), strongly acidic soils with low fertility.

rr *RIVER ROAD*

Landscape--rolling low hills on conglomerates and lithic sandstones of the Conger Formation. Local relief 20 - 50 m, elevation 20 - 100 m and slope gradients up to 40%. Broad gently inclined crests steepen sharply toward midslopes and narrow incised drainage lines. Rock outcrop is occasionally present. Cleared to uncleared tall open-forest.

Soils--shallow (<50 cm) well drained Lithosols (Uc2.21) minor Yellow Podzolic Soils (Dy2.11) on crests and upper slopes. Moderately deep (50 - 150 cm) imperfectly drained Soloths Dy3.41, and Gleyed Podzolic Soils (Dg2.42) on lower slopes and poorly drained areas. Minor mudstones in well drained areas have shallow to moderately deep (30 - 100 cm) well drained Yellow Podzolic Soils (Dy2.21) and Red Podzolic Soils (Dr2.21).

Limitations--steep slopes (localised), water erosion hazard, moderate foundation hazard, rock outcrop (localised), shallow soils (localised), high run-on (localised), seasonal waterlogging (localised) and strongly acidic soils with very low fertility.

Landscape Variant - rra--similar soils and landscape features but with steep slopes commonly >30%.

sb *SHOAL BAY*

Landscape--gently inclined, well drained, Pleistocene sand sheets to rolling very low dunes. Slope gradients generally <5%, but on slopes of rolling dunes up to 15 %. Local relief generally <5 m and elevation < 15 m. Dunes are usually well drained.

Soils--deep (>300 cm) well drained Podzols Uc2.3).

Limitations--wind erosion hazard, groundwater pollution hazard, foundation hazard (localised swamps), permanent waterlogging (localised swamps), permanent high water tables (localised swampy depressions), seasonal waterlogging (localised low lying swales), acid sandy non-cohesive soils with very low fertility.

Landscape Variant - sbc-poorly drained Pleistocene sand sheets. Slopes <3% local relief < 2 m and elevation between 2 m and 6 m. Watertables are often close to the surface (< 70 cm). Small isolated permanently wet areas occur. Cleared to uncleared closed *Melaleuca* forest swamp. Deep (>300 cm) imperfectly drained Humus Podzols (Uc 2.20, Uc 2.33)on sandy rises with Humus Podzols (Uc5.13) in poorly drained areas. Limitations include seasonal waterlogging, high watertables, non-cohesive soil, groundwater pollution hazard, very poor soil fertility, moderate foundation hazard.

sh *SHINGLERS CREEK*

Landscape - narrow to broad drainage plains, slope gradients 2 - 5%. Local relief < 20 m. Narrow often slightly convex alluvial fans on upper slopes grading into broader drainage plains. These areas often have a defined drainage line which receives concentrated flows.

Soils - moderately deep to very deep (100 - >200 cm) imperfectly to poorly drained Soloths

Limitations - high- run-on, flooding (localised), very high erosion hazard, seasonal waterlogging, foundation hazard, high erosion risk, hardsetting sodic impermeable soils of poor fertility.

Landscape variant - sha - gently inclined drainage plains and footslopes which receive run-on predominantly in the form of sheet flows. Limitations include high run-on, high erosion hazard, seasonal waterlogging and acid impermeable soils of poor soil fertility.

Landscape variant - shb - gently to moderately inclined colluvial fans. Limitations include acid hardsetting highly erodible acid soils with poor soil fertility.

sr *STROUD ROAD*

Landscape - undulating rises to rolling low hills on Alum Mountain Volcanics. Slope Gradients < 25%. Local releif 10 - 40 m. Narrow to moderatley broad crests with gently inclined to moderately inclined slopes and narrow often incised drainage lines or narrow drainage flats.

Soils - On basalts occur well drained shallow (< 50) on steeper slopes and ridges and well drainaed moderately deep (50 - 150 cm) Chocolate Soils and Kraznozems . On rhyolite occur Shallow (< 50 cm) well drained Lithosols and Red Podzolic Soils.

Limitations localised highly plastic soils with high shrink-swell, acid soils, localised shallow soils.

tl *THOMPSONS LANE*

Landscape - undulating rises to rolling low hills on Karuah Formation. Slope gradients < 30%, Local relief 30 - 50 m. narrow convex crests, moderately inclined slopes and narrow incised drainage lines.

Soils - Predominantly shallow (< 50 cm) well drained Lithosols (steeper slopes) and moderately deep (50 - 150 cm) well drained Yellow Podzolic Soils. Minor shallow to moderately deep (< 100 cm) Red Podzolic Soils occur.

Limitations - high erosion risk, often shallow stony acid hardsetting soils of poor fertility.

tr *TERREEL RIDGE*

Landscape - steep narrow ridges on conglomerate and sandstones of the Karuah Formation. . Slope gradients > 20%, Local relief 40 - 90 m. Narrow often peaked crests, steeply inclined slopes often with sandstone cobble and stones and occasional narrow colluvial footslopes . Drainage lines are numerous narrow and incised.

Soils - generally shallow (< 50 cm) well drained Lithosols.

Limitations- include mass movement risk (localised), steep slopes, rock and boulder outcrop (localised), very high erosion hazard, foundation hazard, stony, shallow, acid soils of poor fertility.

wi *WALLIS ISLAND*

Landscape - imperfectly to poorly drained Pleistocene sand sheet. Slope Gradients < 5%. Local relief < 3 m. High water table within 100 cm of surface.

Soils - deep (>300 cm) imperfectly drained Humus Podzols

Limitations - permanently high water tables, groundwater pollution hazard, seasonal waterlogging, acid, sandy, non-cohesive soils of very poor fertility.

xx *DISTURBED*

Landscape: Level to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Variable local relief and slopes. Includes quarries, tips, land reclamation and large cut and fill features. Original vegetation cleared, and weeds may be abundant.

Soils: Original soil has been removed, greatly disturbed or buried. Landfill includes soil, rock, building and waste materials.

Significant Soil and Land Qualities: Highly variable; may include foundation hazard, unconsolidated low bearing strength materials, impermeable soils, poor drainage, very low fertility, toxic materials and wind erosion hazard. Sources of sediment and groundwater contamination.

2.6 SOIL LANDSCAPES OF THE PORT STEPHENS 1:100 000 SHEET

am — *ALUM MOUNTAIN*

Landscape--steep strike ridge on the Permian Alum Mountain Volcanics. Slopes generally 20 - 50%, local relief 50 - 70 m elevation 10 to 70 m. Crests narrow rocky and peaked, slopes are steep and often cobble strewn and drainage lines are numerous and narrow. A gentle broad saddle is present.

Soils--shallow (<50 cm) Lithosols/Yellow Podzolic Soils (Dy4.81) on slopes with moderately deep (100 - 200 cm) imperfectly drained Yellow Podzolic Soils (Dy4.11) on the gentle saddle.

Limitations--includes extreme erosion hazard, steep slopes, high foundation hazard, shallow stony soils of low fertility, localised rock fall and localised rock and boulder outcrop.

bf — *BOBS FARM*

Landscape--broad (0.5 - 2.0 km), flat, swampy, holocene estuarine plain. Slope gradients <1% elevation 1 - 3 m ASL. Drains are common. Predominantly cleared Casuarina/Melaleuca swamp.

Soils--deep (>300 cm) very poorly drained Humic Gleys (Dy5.11)

Limitations--flood hazard, foundation hazard, seasonal waterlogging, waterlogging (localised), permanent high watertables, high run-on, saline subsoils (localised) with acid sulphate potential.

cm — *CABBAGE TREE MOUNTAIN*

Landscape--steep low hills on lithic sandstones, conglomerates and minor siltstones of the McInnes Formation. Local relief 30 - 90 m. Slopes > 25%. Elevation 10 - 90 m. Narrow crests and ridges, steep short sideslopes and narrow incised drainage lines. Uneven surface with many cobbles, stones and occasionally boulders. Partially cleared tall open-forest.

Soils--shallow (<50 cm) stony well drained Lithosols (Dy4.51) with minor poorly drained Soloths (Dy3.41) on sandstones with shallow well drained Lithosols (Dy4.11) on siltstones.

Limitations--very high erosion hazard, steep slopes, shallow stony soils with very low soil fertility.

ec — *EMU CREEK*

Landscape--rolling to steep low hills on sediments of the Booral Formation. Slope gradients 20 - 50 %. Local relief 30 - 70 m. Crests are narrow; moderately inclined slopes steepen sharply towards narrow, incised, drainage lines. Terracettes are common on cleared slopes. Partially cleared tall open-forest.

Soils--shallow (<50 cm) well drained Lithosols (Um4.11) and minor moderately deep (50 - 100 cm) imperfectly drained Yellow Podzolic Soils (Dy3.24) on siltstone\mudstones with shallow well drained Lithosols (Um4.11) or moderately well drained Yellow Podzolic Soils (Dy3.21) on sandstones.

Limitations--steep slopes, erosion hazard, foundation hazard, mass movement hazard (localised), shallow soil (localised).

Landscape Variant - eca--hills with slopes generally <15%. Major limitations are erosion hazard, seasonal waterlogging, and high run-on.

es — *EURUNDEREE SWAMP*

Landscape--level to very gently inclined closed depressions (coastal swamps) usually occupying swales and sand dune deflation areas with extremely low relief. Elevation is usually <10 m. Slope gradients are <2%. Uncleared closed swamp forest.

Soils--deep (>300 cm) very poorly drained, Acid Peat/Siliceous Sands intergrade (O,Uc5.11)

Limitations--flood hazard, foundation hazard, high run-on, permanent high watertables, permanent waterlogging, non-cohesive soils, very strongly acidic peaty surface soils.

fc *FULLERTON COVE*

Landscape--tidal flats on Holocene estuarine sediments. Local relief <3 m and slopes <3%. Tidal flats and creeks in coastal inlets and estuaries regularly inundated by brackish tidal waters Uncleared mangrove woodland and salt marsh flats.

Soils--deep (> 300 cm) very poorly drained Solonchaks (O).

Limitations--flood hazard, wave erosion hazard, foundation hazard, waterlogging, high run-on, low wet strength, saline soils with acid sulphate potential.

Landscape Variant - fca - dredged sand and shell fragments have been deposited in mounds along the lower Myall River banks near the entrance to Port Stephens.

gc *GREY GUM CREEK*

Landscape--undulating plain and rises on McInnes Formation. Slope gradients < 5%. Local relief < 10 m. Elevation up to 20 m. Broad crests, relatively long gently inclined slopes and broad drainage plains. Rock outcrop is rare. Predominantly uncleared Angophora/Eucalypt woodland.

Soils--moderately deep to deep (>100 cm) poorly drained Soloths (Dy3.41) on rises with deep (>150 cm) very poorly drained No Suitable Group (Gn3.91) along drainage plains.

Limitations--seasonal waterlogging, water erosion hazard, high run-on, flood hazard (drainage plains), foundation hazard (drainage plains), acidic soils of low fertility.

gg *GAN GAN*

Landscape--steep hills on ignimbrites of the Nerong Volcanics. Slope gradients >25%, local relief 100 - 200 m, elevation 60 - 260 m. Crests are peaked, upper slopes occasionally precipitous, rocky and narrow; slopes are steep, uneven, and boulder strewn, drainage lines are narrow. Cliffs, scarps and insitu rock outcrop are occasionally present. Predominantly uncleared open-forest.

Soils--shallow (<30 cm) well drained Lithosols (Uc 1.12, Uc 2.12) on crests; shallow to moderately deep (<80 cm) Lithosols (Uc 2.12) and imperfectly drained Soloths (Dy 3.41, Dy 2.41) with deep (>200 cm) poorly drained Soloths (Dy 3.41) on footslopes.

Limitations--Steep slopes, mass movement hazard (localised), water erosion hazard, rock and boulder outcrop, shallow soils and foundation hazard.

Landscape Variant - gga - steep colluvial footslopes. Limitations include steep slopes, mass movement hazard, seasonal waterlogging, high run-on, water erosion hazard, foundation hazard.

gh *GREEN HILLS*

Landscape-- undulating to rolling low rises on a conglomerate and sandstone strike ridge of the Karuah Formation. Slope gradients 5 - 15 %, local relief 10 - 30 m, elevation generally 10 - 30 m. Crests are relatively broad (50 -150); upper slopes are short (<50 m), moderately inclined and grade into gently inclined, concave, lower slopes; drainage lines are narrow and shallow. Small hollows are common on the sideslopes. Stones and occasionally boulders may occur. Bedrock outcrop is rare.

Soils--moderately deep (50 - 150 cm) imperfectly drained Soloths (Dy3.31) and minor Yellow Podzolic Soils (Dy2.21).

Limitations--water erosion hazard, foundation hazard, run-on (localised), seasonal waterlogging (localised), rock outcrop (localised), low soil fertility.

mg *MOUNT GEORGE*

Landscape--steep hills on lithic sandstones, conglomerates and mudstones of the Wooton Beds. Local relief 50 - 90 m, elevation 40 - 140 m, slope gradients 20 - 60%. Crests are narrow and convex; slopes are moderately to steeply inclined; drainage lines are steep, narrow and incised. Occasional rock outcrop. Terracettes and small slumps at the heads of drainage lines may occur in cleared areas. Predominantly uncleared tall open-forest.

Soils--shallow (<50 cm) well drained Lithosols (Uc3.12) and Lithosols/Yellow Podzolic Soils (Dy4.11, Dy2.51, Dy4.51) on sandstones and conglomerates with moderately deep (50 - 150 cm) moderately well drained Soloths (Dy2.41) on mudstones and moderately deep (50 - 150 cm) very well drained Structured Siliceous Sands (Uc6.11) along drainage lines.

Limitations--steep slopes, mass movement hazard (localised), foundation hazard, water erosion hazard, high run-on (localised), shallow soil (localised).

mh *MARKWELL HEIGHTS*

Landscape--steep low ridge on Muirs Creek Conglomerate. Slope gradients 30 - 50%. Local relief 10 - 30 m. Ridge crest is narrow, peaked and rocky; slopes are steep, short, often hummocky; drainage lines are narrow and incised. Boulders, cobbles and stones often cover the surface. Small benches (to 20 m in width) are often present. Uncleared open-forest.

Soils--shallow (<50 cm) well drained Lithosols (Um6.21) on slopes with moderately deep (50 - 150 cm) Yellow Earths (Gn2.24) on concave footslopes.

Limitations--steep slopes, mass movement hazard (localised), rock fall hazard (localised), foundation hazard, seasonal waterlogging (localised), high run-on (localised), water erosion hazard, rock and boulder outcrop and shallow stony strongly acidic soils.

mr *MYALL RIVER*

Landscape--floodplain on Quaternary alluvium of the Myall River (upper) above Bombah Broadwater. Elevation <3 m, slope gradients <2%. Broad floodplain of narrow, low levee banks, wide backswamp plain and includes infilled prior channels. Uncleared tall open-forest.

Soils--deep (>300 cm) well drained Prairie Soils (Gn3.91) on levees; deep (>300 cm) very poorly drained Acid Peat (O) on backswamp plain; deep (>300 cm) poorly drained Dark Podzolic Soils (Dd3.51) on infilled prior channel.

Limitations--flooding, foundation hazard, seasonal waterlogging, permanent waterlogging (localised), permanent high watertables, saline soils and potential acidic sulphate subsoils.

nc *NORTH ARM COVE*

Landscape--undulating hills on ignimbrites of the Nerong Volcanics. Local relief to 50 m and slope gradients <15%. Broad crests, gently inclined slopes and narrow drainage lines. Minor rocky peaked crests. Partially cleared to extensively cleared *Eucalypt/Angophora* open-forest to *Eucalypt* tall closed-forest

Soils--moderately deep (50 - 150 cm) imperfectly drained Yellow Podzolic Soils on crests and upper slopes: moderately deep (50 - 150 cm) poorly drained Soloths (Dy2.41, Dy3.41) and minor imperfectly drained Yellow Podzolic Soils (Dy2.31) on lower slopes and drainage lines.

Limitations--high erosion hazard and acidic soils of low fertility with dense, slowly permeable, subsoils with localised shrink-swell.

Landscape variant - nca - Alluvial narrow drainage flat of Bulga Creek consisting of sediments derived mostly from North Arm Cove soil landscape. Major limitation is flooding.

ng *NUNGRA SOIL LANDSCAPE*

Landscape--gently inclined footslopes and drainage plains on Quaternary alluvium. Slope gradient <3% and local relief <10 m. Long (up to 2000 m) gently inclined footslopes with broad ill defined drainage lines grade into broad drainage plains (100 - 2000 m width). Predominantly cleared tall open-forest.

Soils--deep (> 300 cm) poorly drained Soloths (Gn2.94, Gn3.01) and Solodic Soils (Gn2.95, Gn3.06, Dy3.42, Dy3.43, Dy2.43, Dy3.43).

Limitations--water erosion hazard, flood hazard (localised), salinity (localised), foundation hazard, high run-on, seasonal waterlogging, deep silty hardsetting soils with low fertility and very low wet strengths.

no *NERONG*

Landscape--undulating low hills on McInnes Formation. Slope gradients are <15 %. Local relief to 30 m. Broad crests, gently to moderately inclined sideslopes and narrow drainage lines. Minor rock outcrop (<10%). Occasionally sandstone outcrop. Predominantly uncleared woodland with shrub understorey.

Soils--Discontinuous shallow to moderately deep (0 - 100 cm) imperfectly drained Yellow Podzolic Soils (Dy3.31) on sandstones with moderately deep (50 - 100 cm) imperfectly drained Yellow Podzolic Soils (Dy2.31) on siltstone parent material.

Limitations--high erosion hazard, rock outcrop (localised), shallow soils (localised), seasonal waterlogging (localised), low soil fertility.

nw *NERONG WATERHOLES*

Landscape--Infilled Pleistocene lagoon and estuary bordered by the old pleistocene shoreline to the west and by an extensive, pleistocene beach ridge system to the east. Slope gradients <2%, local relief generally < 2 m, and elevation 7 - 9 m ASL. Crabhole gilgai like depressions and mounds are common in some areas. Predominantly cleared swamp forest.

Soils--deep (>300 cm) poorly drained Dark Podzolic Soils (Dd2.11, Dd1.11) with minor (**nwa**) poorly drained Black Earths (Ug5.17).

Limitations--flood hazard, foundation hazard, high run-on, seasonal waterlogging, permanent waterlogging (localised), permanent high watertables.

Landscape Vatiant - nwa - similar landscape features to Nerong Waterholes but with cracking Black Earth soils.

pr *PINDIMAR ROAD*

Landscape--undulating to rolling low hills on mudstones and minor interbeds of lithic sandstones of the Wootton Beds. Local relief 30 - 60 m. Slope gradients up to 25%. Broad crests, gently to moderately inclined slopes with incised upper slope drainage lines grading into broader lower slope drainage plains. Rock outcrop is rare. Cleared to partially cleared tall open-forest.

Soils--shallow to moderately deep (30 -70 cm) well drained Brown Podzolic Soils (Db2.21) and Yellow Podzolic Soils (Dy2.11, Dy2.21, Dy3.11, Dy3.21, Dy4.11) on sandstone parent material; moderately deep to deep (50 - 200 cm) moderately well drained Brown Podzolic Soils (Db1.21, Db2.21, and Yellow Podzolic Soil (Dy3.21 minor Dy2.11); moderately deep to deep (100 - 200 cm) imperfectly drained Soloths (Dy 3.41) in poorly drained areas.

Limitations--high erosion hazard, moderate foundation hazard, shallow soil (localised), seasonal waterlogging (localised), strongly acidic soils with low fertility.

rr *RIVER ROAD*

Landscape--rolling low hills on conglomerates and lithic sandstones of the Conger Formation. Local relief 20 - 50 m, elevation 20 - 100 m and slope gradients up to 40%. Broad gently inclined crests steepen sharply toward midslopes and narrow incised drainage lines. Rock outcrop is occasionally present. Cleared to uncleared tall open-forest.

Soils--shallow (<50 cm) well drained Lithosols (Uc2.21) minor Yellow Podzolic Soils (Dy2.11) on crests and upper slopes. Moderately deep (50 - 150 cm) imperfectly drained Soloths Dy3.41, and Gleyed Podzolic Soils (Dg2.42) on lower slopes and poorly drained areas. Minor mudstones in well drained areas have shallow to moderately deep (30 - 100 cm) well drained Yellow Podzolic Soils (Dy2.21) and Red Podzolic Soils (Dr2.21).

Limitations--steep slopes (localised), water erosion hazard, moderate foundation hazard, rock outcrop (localised), shallow soils (localised), high run-on (localised), seasonal waterlogging (localised) and strongly acidic soils with very low fertility.

Landscape Variant - rra--similar soils and landscape features but with steep slopes commonly >30%.

sb *SHOAL BAY*

Landscape--gently inclined, well drained, Pleistocene sand sheets to rolling very low dunes. Slope gradients generally <5%, but on slopes of rolling dunes up to 15 %. Local relief generally <5 m and elevation < 15 m. Dunes are usually well drained.

Soils--deep (>300 cm) well drained Podzols Uc2.3).

Limitations--wind erosion hazard, groundwater pollution hazard, foundation hazard (localised swamps), permanent waterlogging (localised swamps), permanent high water tables (localised swampy depressions), seasonal waterlogging (localised low lying swales), acid sandy non-cohesive soils with very low fertility.

Landscape Variant - sbc-poorly drained Pleistocene sand sheets. Slopes <3% local relief < 2 m and elevation between 2 m and 6 m. Watertables are often close to the surface (< 70 cm). Small isolated permanently wet areas occur. Cleared to uncleared closed *Melaleuca* forest swamp. Deep (>300 cm) imperfectly drained Humus Podzols (Uc 2.20, Uc 2.33)on sandy rises with Humus Podzols (Uc5.13) in poorly drained areas. Limitations include seasonal waterlogging, high watertables, non-cohesive soil, groundwater pollution hazard, very poor soil fertility, moderate foundation hazard.

ss *SHOAL BAY SWAMP*

Landscape--Reedy deep organic mud swamps with open water. Slope gradients <1% and local relief <1 m.

Soils--deep (>300 cm) waterlogged, very poorly drained Acid Peats (O).

Limitations--flood hazard, foundation hazard, permanent high watertables, waterlogging, high run-on, non-cohesive soil, deep highly plastic muds with very low wet strength.

Landscape Variant - ssa--infilled estuarine depressions (Eurunderee Interbarrier Lagoon and Bombah Bog). Limitations include all those listed above and potential acid sulphate soils at depth.

sw *SWAMP TRAIL*

Landscape--gently inclined footslope on Permian sediments of the Bulahdelah Formation. Local relief <5 m, slope gradients <10%, elevation to 20 m. Slopes are smooth and concave. Uncleared eucalypt tall open-forest.

Soils--deep (> 130 cm) imperfectly drained Grey Leached Earths (Gn2.94).

Limitations--very high erosion hazard, high run-on, seasonal waterlogging, strongly acidic soils with low fertility.

tb *THE BRANCH*

Landscape--broad, partially dissected, possibly Tertiary aged estuarine plain with clay sediments. Local relief 0 - 20 m, slope gradients generally < 4% but in dissected areas up to 12 %.. Elevation generally < 20 m. Small gilgai like depressions are common and often contain freshwater crayfish burrows.

Soils--deep (>300 cm) poorly drained Soloths (Db2.41, Dy2.41, Dy3.41) minor Solodics (Db1.42)

Limitations--Localised flooding, very high erosion hazard, high foundation hazard, seasonal waterlogging, high water run-on and soils with low fertility, high shrink-swell, and high plasticity.

Landscape Variant - tba-lower clay drainage plains consisting which dissect The Branch soil landscape. Major limitations are flooding and potential salinity.

tr *TERREEL RIDGE*

Landscape-- steep narrow ridge on sandstones and conglomerates of the Karuah Formation. Slope gradients >20%. Local relief 30 - 100 m. Crests are thin narrow and often peaked; slopes are steeply inclined: drainage lines shallowly incised. Numerous boulders, cobble and stones. Partially cleared tall open-forest. Terracettes occur in cleared areas which are grazed regularly.

Soils--shallow (<50 cm) well drained Lithosols (Um4.11).

Limitations--Steep slopes, water erosion hazard, rock and boulder outcrop (localised), foundation hazard, high run-on (localised), shallow stony soils of low fertility.

ty *TAMBOY*

Landscape--permanently inundated nearshore organic sediments, estuarine/brackish flats and lake shore sediments and very low sandy plains. Slope gradients generally <2%, local relief <2 m and elevation <3 m. Uncleared swamp with minor areas of tall open-forest.

Soils--predominantly deep (>300 cm) Acid Peats (O). Deep (> 300 cm) imperfectly drained Humus Podzol/Siliceous Sands intergrade (Uc 5.1) on sandy rises.

Limitations--flooding, saline, potential acid sulphate subsoils, foundation hazard (localised), permanent high water tables, waterlogging (localised), seasonal waterlogging,and non-cohesive soils.

Landscape Variant - tya - deep organic muds infilling the edge of river channels and the Broadwater as well as old prior river channels of the Myall River

2.6 SOIL LANDSCAPES OF THE NEWCASTLE 1:100 000 SHEET

ba *BLIND HARRYS SWAMP*

Landscape--waterlogged swales and deflation areas on sands of the Tomago Coastal Plain. Elevation <10m, slope gradients <2%, local relief <1 m. Uncleared swamp forest.

Soils--Deep (>150 cm) poorly drained Acid Peat-Siliceous Sands (O, Uc5.11)

Limitations--permanently high watertables, foundation hazard, permanently waterlogged, groundwater pollution hazard, strongly acid soils.

be *BERESFIELD*

Landscape--undulating low hills and rises on Permian sediments in the East Maitland Hills region. Slope gradients 3 - 15%, local relief to 50 m, elevation is 20 -50 m. Partially cleared tall open-forest.

Soils--moderately deep (<120 cm) moderately well to imperfectly drained Yellow Podzolic Soils (Dy2.21), Brown Podzolic Soils (Db1.21) and brown Soloths (Db2.41) occur on crests with moderately deep (<120 cm) well-drained Red Podzolic Soils (Dr2.21) and red Soloths (Dr2.41) on upper slopes, moderately well to imperfectly drained brown Soloths (Db2.41, Db1.41) and yellow Soloths (Dy3.41) on sideslopes and deep (>200 cm) imperfectly to poorly drained Yellow Podzolic Soils (Dy2.21), yellow Soloths (Dy2.41, Dy3.41) and Gleyed Podzolic Soils (Dg2.41) on lower slopes.

Limitations--high foundation hazard, water erosion hazard, Mine Subsidence District, seasonal waterlogging and high run-on on localised lower slopes, highly acid soils of low fertility.

Landscape Variant--bea--steeper upper slopes (15 - <25%).

bf *BOBS FARM*

Landscape--broad interbarrier estuarine flat on the Tomago Coastal Plain. Slope gradients <1%, elevation 1-3 m, local relief <1 m. Open woodland.

Soils--deep (>300 cm), very poorly drained Humic Gleys (no suitable PPF, Dy5.11)

Limitations--permanently high watertables, seasonal waterlogging, foundation hazard, flood hazard, potential acid sulphate soils.

Landscape Variant--bfa--low, remnant lake shore beach deposits. Up to 1 m relief, 15 m width and 200 m in length.

bh *BOLWARRA HEIGHTS*

Landscape--rolling low hills on Permian sediments in the centre-west of the sheet in the East Maitland Hills region. Slopes are 5 - 20%, elevation to 100 m, local relief to 80 m. Cleared tall open-forest.

Soils--moderately deep (<150 cm) well-drained Yellow Podzolic Soils (Dy2.21, Dy2.31), Red Podzolic Soils (Dr2.31, Dr3.21) and Brown Podzolic Soils (Db1.21, Db1.11) with some moderately deep (<100 cm) well-drained Lithosols (Um1.41, Um1.42) on crests, moderately deep (<140 cm) imperfectly drained yellow Soloths (Dy2.41, Dy3.41) on lower slopes.

Limitations--moderate foundation hazard, water erosion hazard, high run-on (localised), seasonal waterlogging (localised), localised steep slopes with mass movement hazard.

Landscape Variant--bha--shallow (<55 cm) soils.

br *BRECON*

Landscape--undulating rises to low hills on Carboniferous sediments and ignimbrites of the Paterson Mountains and Clarencetown Hills regions. Slopes are 2 - 10%, local relief is up to 30 m, elevation to 70 m. Cleared tall open-forest.

Soils--moderately deep (50->130 cm) well to imperfectly drained brown Soloths (Db1.41) and yellow Soloths (Dy2.41) with some shallow (40 cm) rapidly drained Lithosols (Um1.42) on crests and some deep (>180 cm) well drained Brown Podzolic Soils (Db1.11, Db2.11).

Limitations--water erosion hazard, foundation hazard due to highly plastic, moderate shrink-swell (reactive) subsoils, high run-on and seasonal waterlogging on lower slopes.

Landscape variant--bra--imperfectly to poorly drained lower slopes.

cl *CLARENCETOWN*

Landscape--undulating low hills on Carboniferous sediments in the Clarencetown Hills region. Slope gradients 5 - 15%, elevation 40 - 80 m, relief 30 - 70 m. Partially cleared tall open-forest and open-forest.

Soils--moderately deep (55 - >100 cm), moderately well to imperfectly drained yellow Soloths (Dy2.41, Dy3.41), shallow (<50 cm), moderately well drained Lithosols (Um2.12, Um4.22).

Qualities and Limitations--very high water erosion hazard, shallow soils, rock outcrop, seasonal waterlogging (localised) stony acid soils of very low fertility.

fc *FULLERTON COVE*

Landscape--tidal flats and creeks in tidal inlets and estuaries in the Lower Hunter Plain and Medowie Lowlands regions. Slope gradients <3%, elevation <3 m and local relief <3 m. Mangrove scrub and saltmarsh, some open-forest.

Soils--deep (>100 cm), very poorly drained Solonchaks (O, Uf6.51).

Limitations--flooding, wave erosion hazard and foundation hazard, saturated, saline, potential acid sulphate soils.

gi *GILMORE HILL*

Landscape--steep, conical hills on Carboniferous lithic sandstone and ignimbrites in the Clarencetown Hills region. Slopes 20 - >50%, relief 120 - 170 m, elevation 150 - 230 m. Uncleared open-forest.

Soils--shallow to moderately deep (45-85 cm) rapidly drained Bleached Loams/Lithosols (Um2.12, K-Um2.12, Um2.21) and shallow to moderately deep (40 - >80 cm) well to imperfectly drained yellow Soloths (Dy2.41) and Grey Earths (Gn2.94).

Qualities and Limitations--steep slopes, water erosion hazard, rock outcrop, foundation hazard, shallow, stony strongly acid soils of low fertility.

hs *HEXHAM SWAMP*

Landscape--broad, swampy, estuarine backplains on the Hunter delta. Slopes <1%, local relief <2 m, elevation to 2 m. Sedgeland with open-woodland on swamp margins.

Soils--deep (>200 cm) waterlogged Humic Gleys (Gn2.83, Gn3.93, Gn3.92, Uf6.41, Uf6.6, Uf5.4).

Limitations--flood hazard, permanently high watertable, seasonal waterlogging, foundation hazard, groundwater pollution hazard, localised tidal inundation, highly plastic potential acid sulphate soils of low fertility.

hu *HUNTER*

Landscape--extensive alluvial plains on recent alluvium derived from the Hunter and Paterson rivers, in the Hunter Plain region in the centre of the area. Slope gradients are <1%, elevation is 2 - 11 m, local relief is to 2 m. Completely cleared tall open-forest and closed forest.

Soils--deep (>150 cm) moderately well to imperfectly drained Prairie Soils (Gn3.42, Gn3.22, Gn3.41, Gn3.12), deep (>150 cm) imperfectly to poorly drained Brown Clays (Uf6.32, Uf6.12, Ug5.15, Ug6.4), some deep (>150 cm) well drained Chernozems (Um6.11, Um6.12). Deep (>200 cm) well to imperfectly drained Alluvial Soils (Um5.52) on levees, oxbows, and recent overbank deposits. Moderately deep (>80 cm) well drained Siliceous Sands (Uc1.23) on point bar and river bank deposits.

Qualities and Limitations--flood hazard, foundation hazard, permanently high watertables (localised), seasonal waterlogging (localised), productive arable land and soils of high fertility.

Landscape Variant--hua--swampy backplains
hub--oxbows, recent overbank deposits, crevasse splays and broad levees

me *MEDOWIE*

Landscape--gently undulating low hills on relict sediments in the Medowie Lowlands region. Very broad, flat crests and long gently inclined sideslopes. Slopes 2 - 15%, elevation 30 - 70 m, local relief to 30 m. Partially cleared open-forest.

Soils--deep (>150 cm), well drained red and yellow Structured Loams (Um4.13, Um6.13, Um6.12, Um6.41) on deeply weathered clay deposits and moderately deep to deep (60 - >200 cm), well drained Red Podzolic Soils (Dr2.21) and deep (200 - >300 cm) Yellow Podzolic Soils (Dy3.21, Dy2.11), with some shallow well drained Lithosols (Um1.43) on sandy/pebbly deposits with clay lenses.

Qualities and Limitations--seasonal waterlogging (localised lower slopes), water erosion hazard (localised), strongly acidic soils with low inherent fertility and high potential aluminium toxicity.

mf *MILLERS FOREST*

Landscape--extensive alluvial plain on Recent sediments in the Hunter Plain region in the centre of the sheet. Elevation is 6 - <3 m, local relief is <1 m, slope gradients are <1%. Cleared tall open-forest.

Soils--deep (>150 cm) imperfectly to poorly drained Prairie Soils (Gn3.21, Gn3.23).

Qualities and Limitations--flood hazard, permanently high watertables, seasonal waterlogging and foundation hazard, low wet bearing strength soils.

sb *SHOAL BAY*

Landscape--Pleistocene sandsheets and low dunes on the Tomago Coastal Plain. Slope gradients generally <15%, local relief <10 m, elevation <15 m. Partially cleared tall open-forest.

Soils--deep (>300 cm) well drained Podzols (Uc2.3), with deep (>300 cm) imperfectly drained Humus Podzols (Uc2.33) on low rises and deep (>300 cm) poorly drained Humus Podzols (Uc 5.13) on poorly drained flats and depressions.

Limitations--wind erosion hazard, groundwater pollution hazard, steep slopes (localised), foundation hazard (localised swamps), permanent waterlogging (localised swamps), permanent high water tables (localised swampy depressions), seasonal waterlogging (localised low lying swales), acid sandy non-cohesive soils with very low fertility.

Landscape Variants-- **sba** - steep high dunes
sbb - areas of dry heath which appear to be burnt regularly
sbc--poorly drained Pleistocene sand sheets.

sh *SHAMROCK HILL*

Landscape--rolling low hills on Permian sediments in the East Maitland Hills region. Slopes are 10 - 15%, elevation is 40 - 90 m, local relief is up to 60 m. Uncleared tall open-forest.

Soils--shallow to moderately deep (<120 cm) well-drained Yellow Podzolic Soils (Dy2.41) and Red Podzolic Soils (Dr3.31), some moderately deep (>80 cm) imperfectly drained Yellow Soloths (Dy3.41) on midslopes and some shallow (<50 cm) rapidly drained Bleached Loams (Um2.12).

Limitations--water erosion hazard, Mine Subsidence District, localised steep slopes, strongly acid soils of low fertility.

tb *THE BRANCH*

Landscape--broad plains on deep Pleistocene clay deposits in the Medowie Lowlands. Slope gradients are <2%, local relief is <1m, elevation is 15 - <30 m. Partially cleared tall open-forest and woodland.

Soils--deep (>300 cm), poorly drained Soloths (Dy2.41, Dy3.41, Db2.41, Dy2.42).

Qualities and Limitations--seasonal waterlogging, foundation hazard, highly erodible, strongly acidic soils with extremely low wet strength, low fertility and low permeability.

Landscape Variant - tba--lower drainage plains consisting of clay which dissect The Branch soil landscape, with deep (>300 cm), very poorly drained Prairie Soils (Gn3.92).
Landscape Variant - tbb--Pleistocene mangrove flat deposits, with deep (>100 cm) poorly drained Brown Podzolic Soils (Db3.11).

tm *TEN MILE ROAD*

Landscape--undulating low hills on Carboniferous sediments and acid volcanics in the Medowie Lowlands and Clarencetown Hills regions. Local relief is 40 - 80 m. Elevation is 70 - 150 m. Slopes are 5 - 10%. Uncleared open-forest.

Soils--moderately deep (55 cm) to deep (>200 cm) well to imperfectly drained brown Soloths (Db1.41), yellow Soloths (Dy2.41, Dy3.41), and shallow well drained (<45 cm) Bleached Loams/Lithosols (Um2.12, K-Um2.12).

Qualities and Limitations--high water erosion hazard, localised shallow soils, high run-on and seasonal waterlogging, strongly to extremely acid soils of low fertility.

Landscape variant--tma--rolling low hills, slope gradients 10 - 20%.

wg *WALLALONG*

Landscape--undulating low hills on sediments of the Permian Dalwood Group in the East Maitland Hills region. Crests are broad (300 - 500 m) with gentle (2 - 10%) convex rounded sideslopes and incised drainage lines. Elevation is up to 50 m, local relief is up to 30 m. Extensively cleared tall open-forest.

Soils--moderately deep to deep (100 - 200 cm) moderately well to imperfectly drained yellow Soloths (Dy2.41) and black Soloths (Dd1.41) and shallow (<60 cm) rapidly drained Lithosols (Um2.12), some shallow to moderately deep (<50 - 100 cm), well drained Brown Podzolic Soils (Db1.12) and Yellow Podzolic Soils (Dy2.21)

Qualities and Limitations--high water erosion hazard, foundation hazard, high run-on (localised), seasonal waterlogging (localised) and shallow soils (localised) with very high acidity and very low fertility.

Landscape Variant-wga--alluvial fans and drainage plains with slopes of 1-3%.

wr *WILLIAMS RIVER*

Landscape--flat to gently undulating, narrow to moderately broad floodplains on recent alluvium along the Williams River in the Clarencetown Hills region. Slopes are <2%, elevation to 15 m, local relief to 7 m Narrow low-level terraces and minor oxbows are common. Completely cleared.

Soils--moderately deep (60 - >130 cm), imperfectly to poorly drained Alluvial Soils (Um6.11, Um6.12) and Prairie Soils (Gn3.21), with deep (>300 cm), well drained Alluvial Soils (Um1.23) on levee deposits and low level terraces.

Qualities and Limitations--high flood hazard, permanently high watertables, seasonal waterlogging, foundation hazard, water erosion hazard very strongly acid soils of low fertility and potential aluminium toxicity.

Landscape Variant--wra--narrow, low level terrace deposits

xx *DISTURBED*

Landscape: Level to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Variable local relief and slopes. Includes quarries, tips, land reclamation and large cut and fill features. Original vegetation cleared, and weeds may be abundant.

Soils: Original soil has been removed, greatly disturbed or buried. Landfill includes soil, rock, building and waste materials.

Significant Soil and Land Qualities: Highly variable; may include foundation hazard, unconsolidated low bearing strength materials, impermeable soils, poor drainage, very low fertility, toxic materials and wind erosion hazard. Sources of sediment and groundwater contamination. .

RTA PACIFIC HIGHWAY STUDY

TABLE 1 COFFS HARBOUR - DORRIGO SOIL LANDSCAPES

Soil Landscape	Limitations to Major Road Construction Class	Reasons	Limitations to Farming Class	Reasons
bc	L	(Ea)(L)	H	PcPp
bd	M	(F)W	S	EiWPcPp
be	M	F(E)(W)(L)	L	F(W)
bn	L	(Ea)L	H	EaWPc
bo	H	REaMX	S	REaPcPp
bu	L	L	M	EaPcPp
bw	H	REaM	S	REaPcPp
bwa	M	(R)Ea (M)	H	(R)EaPcPp
cc	M	F(Ea)(W)(L)	L	FPcPp
cca	M	FWL	H	FEaWPc
cf	H	FEiWL	S	FEiWPcPp
ch	H	FWAL	S	FWAPpPcS
ci	M	FWL	L	F(W)PcPp
da	M	(F)(Ea)(W)L	L	FEaWPc
de	M	(R)EaL	M	(R)EaPcPp
di	H	REaM	H	EaMPpK
gl	M	EaWLP	H	EaPcPp
gn	L	(Ea)L	L	Pc
go	H	EaEiW	S	EaEiPcPpS
ko	M	Ea(W)LP	M	Ea(W)PcPp
lo	M	REa	H	EaPcPp(S)
me	M	(R)Ea(M)(L)(X)	H	EaPc
mo	M	(F)(Ea)WL	H	EaWPc
nn	H	REaMLX	S	REaPc
np	M	FWL	H	FWPcPp
pl	L	(Ea)(M)(L)	M	EaPc
pn	M	(R)Ea(L)	H	EaPcPp
pna	L	(Ea)	M	EaPcPp
ra	L	(F)(Ea)(W)	L	(F)(Ea)(W)Pc
rr	L	Ei	H	EiPpPcK
sc	L	(F)(W)(Ea)	M	(W)PpPc
su	H	REaMLX	S	EaPc
tm	H	FWLA	S	FEaAPcS
tw	H	REaL(X)	H	EaPc
ul	M	(R)(Ea)	M	EaPcPp
xx	H		H	

Limitations to Major Road Construction

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion Hazard
Ei	Wind Erosion Hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
L	Low Strength Soils
H	Shrink Swell Soils
P	Plastic Soils
X	Excavation Difficulty

Limitations to Farming

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion hazard
Ei	Wind Erosion hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
Pp	Physical Plant Growth Hazard
Pc	Chemical Plant Growth Hazard
K	Soil Workability Hazard
S	Soil Salinity

TABLE 2 RTA PACIFIC HIGHWAY STUDY
MACKSVILLE - NAMBUCCA SOIL LANDSCAPES

Soil Landscape	Limitations to Major Road Construction Class	Reasons	Limitations to Farming Class	Reasons
ae	L	(F)(Ea)L	L	(F)
aea	M	WLP	L	(F)W
bg	H	(F)WL	H	FWAPcS
bga	H	FWL	H	FWAPcS
br	H	(F)EaWL(P)	H	FEaWPp
bs	H	REaLMX	H	EaMPpPcK
ca	H	(F)EaWL(P)	H	(F)WEaPpPc
cf	H	FEiWL	H	FWEiPc
ch	H	FWL	H	AFWPcS
ck	H	FWL	H	FWPcSA
di	H	REaM	H	EaMPpK
eu	L	EaL	M	EaPpPc
gd	M	(F)W	L	(F)W
go	H	FEaEiL	H	FEaEiPcS
kg	M	EaWL	H	EaWPpK
ma	H	(F)EaWL	H	F(Ea)WAPcS
mr	H	FWL(P)	M	FWA
mrw	H	FWL	H	FWA
my	M	FEaL	L	F(Ea)
myb	M	FEaL	L	F(Ea)
ne	L	(W)(P)	L	Ea(W)
nr	H	FEaWL	M	F(Ea)(W)
nra	M	EaL	M	EaPp
nrb	H	FEaWLX	M	FEaWPpK
pc	M	(F)EaWL(P)	M	FEaWPp
pn	M	(R)Ea(M)(P)	M	EaMPp
ra				
rn	M	EaM	M	EaM
rw	M	(R)Ea	M	Ea
rwa	L	Ea	L	Ea
se	H	FWL	H	FWPcSA
si	H	FEaWL	H	AFWEaPcS
sp	H	EiOl	M	EiPc
spa	H	FEiWL	H	FEiWPc
spb	H	WL	M	EiWPp
spc	H	FWL	H	FPpPcKS
tb	M	(R)EaX	H	EaPpK
tm	H	FEaWL	H	FEaWPpK
vl	M	EaWL	M	(W)EaPpPc
vla	M	EaWL	M	(W)EaPpPc
wa	L		L	
ww	H	REaPM(X)	H	MEa
wwa	H	REaML(X)	H	EaM
wwb	H	REaMP	H	EaM
ya	H	REa	H	Ea
xx	M		M	

Limitations to Major Road Construction

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion Hazard
Ei	Wind Erosion Hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
L	Low Strength Soils
H	Shrink Swell Soils
P	Plastic Soils
X	Excavation Difficulty

Limitations to Farming

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion hazard
Ei	Wind Erosion hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
Pp	Physical Plant Growth Hazard
Pc	Chemical Plant Growth Hazard
K	Soil Workability Hazard
S	Soil Salinity

TABLE 3 **RTA PACIFIC HIGHWAY STUDY**
KEMPSEY SOIL LANDSCAPES

Soil Landscape	Limitations to Major Road Construction Class	Reasons	Limitations to Farming Class	Reasons
ae	M	(F)(Ea)L	L	
bf	H	FEaWX	M	FEaPp
bl	H	FWALP	H	F(Ei)WAPc
bp	H	FWAL(P)	S	FWAPpPcS
bw	L	Ea	L	EaPc
ca	M	(F) WL	M	(F)WPpPc
cc	H	FWALP	H	FWAPpPcS
ck	H	FWALP	H	FWAPc(S)
co	H	REa(M)	S	REa(M)PpK
cos	H	REaM	S	REaMPpK
cp	M	(R)Ea	M	(R)EaPpk
de	H	FWAL	S	FWAPpPc
eu	L	EaL	M	EaPpPc
gd	M	F(W)AL	M	F(W)AS
gdw	M	FWAL	M	FWAS
hh	M	(F)EiWL	H	(F)EiWPc
kg	L	EaLHP	M	(W)EaPpPcK
ki	M	EiL	S	EiPpPcK
kr	L	Ei	M	EiPpPc
lf	M	FEaL	L	F(Ea)
li	L	(F)(Ei)	M	(F)(Ei)PpPcK
mm	M	(F)EaLH	M	(F)EaWPc
mr	M	F(W)L	M	F(W)APpPc
mrw	M	FWL	H	FWAPpPc
pc	M	FWL	M	FPpPcK
rb	L	H	L	Pc
rf	M	FL	L	F
rh	L	(R)EaP(M)	L	EaPc
th	L	EaLH	L	EaPc
ths	M	(R)EaLH	L	(R)EaPc
to	L	(F)(Ei)	L	(F)(Ei)
xx	M		H	

Limitations to Major Road Construction

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion Hazard
Ei	Wind Erosion Hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
L	Low Strength Soils
H	Shrink Swell Soils
P	Plastic Soils
X	Excavation Difficulty

Limitations to Farming

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion hazard
Ei	Wind Erosion hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
Pp	Physical Plant Growth Hazard
Pc	Chemical Plant Growth Hazard
K	Soil Workability Hazard
S	Soil Salinity

RTA PACIFIC HIGHWAY STUDY

TABLE 4 **CAMDEN HAVEN SOIL LANDSCAPES**

Soil Landscape	Limitations to Major Road Construction Class	Reasons	Limitations to Farming Class	Reasons
ba	L	(Ea)	M	EaPp
bb	M	Ea(W)L	H	(R)Ea(W)Pp
be	M	REa(H)	H	EaKpPc
bt	H	REaMX	H	REaMPpK
cb	H	EaEiL	H	EaEiPc
cn	M	EaW(F)(L)	H	WPpPc
cna	H	FWL	H	FWPc
cr	H	(F)EaW(L)	M	WPpPc
dc	H	FWAL	H	FWAPcS
fa	L	(H)	M	Pc
fr	L	(H)	M	Pc
gh	M	Ea(W)L	H	Ea(W)Pc
gha	H	EaWL	H	EaPpPc
gr	H	FWL	H	FWPc
he	H	FEaWL	M	FEa(W)
hm	M	Ea(X)	H	EaPpPc
ho	L	(Ea)	M	(Ea)PpK
hv	H	EaLX	M	EaPp
ji	H	FWL(H)	M	AFW
jn	H	REaMX	H	RMEaPpK
jna	H	REaMX	H	RMEaPpK
ky	H	(F)Eil	H	(F)EiPc
la	M	EaWL	M	EaPpPc
lu	M	EaL	M	Ea
me	M	EaWLH	H	EaWPpK
ml	L		L	Pc
mt	H	REa	H	REaKpPc
pb	H	FEaWAL	H	EaAFWPcS
pi	H	AFWL	H	AFWPcS
pn	H	(F)EaWL(H)	H	Ea(F)WPpPc
sh	H	(F)EaW(L)	H	EaWPpPc
th	L	EaLH	L	EaPc
up	M	EaL	M	EaPp
wa	M	(F)(W)	M	(F)(W)
xx	H	EaWL(H)	H	Ea(W)PpPc

Limitations to Major Road Construction

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion Hazard
Ei	Wind Erosion Hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
L	Low Strength Soils
H	Shrink Swell Soils
P	Plastic Soils
X	Excavation Difficulty

Limitations to Farming

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion hazard
Ei	Wind Erosion hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
Pp	Physical Plant Growth Hazard
Pc	Chemical Plant Growth Hazard
K	Soil Workability Hazard
S	Soil Salinity

TABLE 5 RTA PACIFIC HIGHWAY STUDY
BULAHDELAH SOIL LANDSCAPES

Soil Landscape	Limitations to Major Road Construction Class	Reasons	Limitations to Farming Class	Reasons
am	H	REa(H)(P)(X)	S	REaMPpPcK
ar	M	(R)Ea(P)	H	EaPpPcK
bd	M	Ea(P)	M	EaPpPc
bda	M	Ea(P)	H	EaPpPcK
be	M	(R)Ea(P)	H	EaPpPcK
bn	H	REaM	S	REaPpPcMK
br	M	Ea(L)(P)	H	EaPpPcK
bra	L	Ea(P)	M	EaPpPc
bu	M	(R)Ea(P)	H	EaPpPcK
cib	H	FWAL	S	FWAPcS
cl	M	(R)Ea(P)	H	EaPpPcK
cm	H	REa(X)	S	REaPpPcK
cma	M	Ea	H	EaPpPcK
co	M	Ea(P)	H	EaPpPcK
cr	H	(F)EaW(L)	M	WPpPc
cra	H	FW	M	FPc
ct	H	REa	S	REaPpPcMK
ec	H	REa(P)	S	EaPpPcK
eca	M	Ea	H	EaPc
fo	M	Ea(P)	H	EaPpPcK
foa	L	(W)(P)	H	EaPpPc
fr	L	(P)	M	Pc
fs				
gc	M	Ea(L)	H	EaWPpPcK
gg	H	REa(L)X	S	REaPpPcK
gga	H	REaLK	S	REaPpPcK
kt	H	REa(P)	S	REaPpPcK
mf	H	FWAL	M	FWAS
mfa	H	FWAL	M	FWAS
mh	H	REa(M)(X)	S	REaPpPcK
mha	M	Ea(M)(X)	H	EaPpPcK
mr	H	FWAL	H	FWAS
mra	H	FAL	M	FS
mrb	H	FWAL	S	FWAS
mt	H	REa	S	REaPpPcK
my	H	REa	S	REaPpPcK
pp	M	(R)Ea	M	EaPpPc
pr	M	REa(P)	H	EaPpPcK
rr	M	REa(P)	H	EaPpPcK
sb	M	Ei	H	EiPpPc
sh	H	(F)EaW(L)	H	EaWPpPc
sha	H	EaW(L)	H	EaWPpPc
shb	M	Ea(W)(L)	H	EaPpPc
sr	L	P(X)	L	PpK
tl	M	Ea	H	EaPpPc
tn	M	W	H	WPpPcK
tr	H	REa(X)	S	REaPpPcK
wi	M	W	H	WPcPp
wr	M	W	H	WPpPcK
xx	M		M	

Limitations to Major Road Construction

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion Hazard
Ei	Wind Erosion Hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
L	Low Strength Soils
H	Shrink Swell Soils
P	Plastic Soils
X	Excavation Difficulty

Limitations to Farming

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion hazard
Ei	Wind Erosion hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
Pp	Physical Plant Growth Hazard
Pc	Chemical Plant Growth Hazard
K	Soil Workability Hazard
S	Soil Salinity

TABLE 6

RTA PACIFIC HIGHWAY STUDY
PORT STEPHENS SOIL LANDSCAPES

Soil Landscape	Limitations to Major Road Construction Class	Reasons	Limitations to Farming Class	Reasons
am	H	REa(H)(P)(X)	S	REaMPpPcK
bf	H	FWAL(P)	M	FWAPcKS
cm	H	REa(X)	S	R'EaPpPcK
ec	H	REa(P)	S	EaPpPcK
eca	M	Ea	H	EaPc
es	H	FWL	S	WPpPcK
fc	H	FWA(L)(P)	S	FWAPcKS
gc	M	Ea(L)	H	EaWPpPcK
gg	H	REa(L)X	S	R'EaPpPcK
gga	H	REaLK	H	REaPpPcK
gh	M	EaR(X)	H	EaPcK
mg	H	REa(P)	S	REaPpPcK
mr	H	FWA(L)	H	FWAPcK
nc	M	(R)Ea(X)	H	EaWPpPcK
nca	H	FW(L)	H	FPc
ng	H	(F)'EaWL	H	EaWPcK
no	M	Ea(P)	H	EaPpPc
nw	H	(F)W(P)	M	WPpPcK
nwa	H	(F)(W)(H)P	M	WPpPcK
pr	M	REa(P)	H	EaPpPcK
rr	M	REa(P)	H	EaPpPcK
rra	H	REa	S	EaPpPcK
sb	M	Ei	H	EiPpPc
sbc	M	W	H	WPpPc
ssa	H	FWL	S	WPpPcK
sw	M	(W)	M	EaW
tb	M	(F)EaW(P)	H	EaWPpPcK
tba	H	(F)W	H	PpPcKS
tn	M	W	H	WPpPc
tr	H	REa(X)	S	R'EaPpPcK
ty	H	FWAL	S	FWAPpPcKS
tya	H	FWA(L)	S	'FWAPpPcKS
xx	M		M	

Limitations to Major Road Construction

R	Rugged Terrain
F	Flooding Hazard
Ea	Water Erosion Hazard
Ei	Wind Erosion Hazard
W	Waterlogging
M	Mass Movement Hazard
A	Acid Sulphate Soils
L	Low Strength Soils
H	Shrink Swell Soils
P	Plastic Soils
X	Excavation Difficulty

Limitations to Farming

R	Rugged Terrain
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Ei	Wind Erosion hazard
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M	Mass Movement Hazard
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Pp	Physical Plant Growth Hazard
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K	Soil Workability Hazard
S	Soil Salinity

RTA PACIFIC HIGHWAY STUDY

TABLE 7 **NEWCASTLE**

Limitations to Major Road Construction

Soil Landscape	Class	Reasons
ba	H	FW
be	M	Ea(P)
be	M	(R)Ea(P)
bf	H	FWAL(P)
bh	M	R'Ea(M)(P)
br	M	Ea(L)(P)
cl	M	(R)Ea(P)
cm	H	REa(X)
ec	H	REa(P)
eca	M	Ea
ecb	H	REa(M)
fc	H	FWA(L)(P)
gg	H	REa(L)X
gga	H	REaLK
gi	H	REa(X)
hs	H	FWA(P)
hu	M	F(L)(P)
hub	M	F
me	M	Ei(P)
mf	H	FWAL
nc	M	(R)Ea(X)
nca	H	FW(L)
ng	H	(F)'EaWL
nw	H	(F)W(P)
nwa	H	(F)(W)(H)P
rr	M	REa(P)
rra	H	REa
sb	M	Ei
sba	M	Ei
sbc	M	W
sh	H	(F)EaW(L)
ssa	H	FWL
tb	M	(F)EaW(P)
tba	H	(F)W
tm	M	EaL(P)
tna	M	W
tnb	M	W
tr	H	REa(X)
wg	M	EaL
wr	M	W
xx	M	

Limitations to Farming

Class	Reasons
S	WPpPcK
M	EaPpPc
H	EaPpPcK
M	FWAPcKS
H	EaPc
H	EaPpPcK
H	EaPpPcK
S	R'EaPpPcK
S	EaPpPcK
H	EaPc
S	REaPpPcK
S	FWAPcKS
S	R'EaPpPcK
H	REaPpPcK
S	R'EaPpPcK
S	FWAPcKS
L	F
L	F
M	EaPpPc
M	FWAS
H	EaWPpPcK
H	FPc
H	EaWPcK
M	WPpPcK
M	WPpPcK
H	EaPpPcK
S	EaPpPcK
H	EiPpPc
H	EiPpPc
H	WPpPc
H	EaWPpPc
S	WPpPcK
H	EaWPpPcK
H	PpPcKS
H	EaPpPcK
H	WPpPc
H	WPpPc
S	R'EaPpPcK
H	EaPpPc
H	WPpPcK
M	

Limitations to Major Road Construction

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RTA PACIFIC HIGHWAY STUDY

TABLE 7 NEWCASTLE

Soil Landscape	Limitations to Major Road Construction Class	Reasons	Limitations to Farming Class	Reasons
ba	H	FW	S	WPpPcK
be	M	Ea(P)	M	EaPpPc
be	M	(R)Ea(P)	H	EaPpPcK
bf	H	FWAL(P)	M	FWAPcKS
bh	M	R'Ea(M)(P)	H	EaPc
br	M	Ea(L)(P)	H	EaPpPcK
cl	M	(R)Ea(P)	H	EaPpPcK
cm	H	REa(X)	S	R'EaPpPcK
ec	H	REa(P)	S	EaPpPcK
eca	M	Ea	H	EaPc
ecb	H	REa(M)	S	REaPpPcK
fc	H	FWA(L)(P)	S	FWAPcKS
gg	H	REa(L)X	S	R'EaPpPcK
gga	H	REaLK	H	REaPpPcK
gi	H	REa(X)	S	R'EaPpPcK
hs	H	FWA(P)	S	FWAPcKS
hu	M	F(L)(P)	L	F
hub	M	F	L	F
me	M	Ei(P)	M	EaPpPc
mf	H	FWAL	M	FWAS
nc	M	(R)Ea(X)	H	EaWPpPcK
nca	H	FW(L)	H	FPc
ng	H	(F)'EaWL	H	EaWPcK
nw	H	(F)W(P)	M	WPpPcK
nwa	H	(F)(W)(H)P	M	WPpPcK
rr	M	REa(P)	H	EaPpPcK
rra	H	REa	S	EaPpPcK
sb	M	Ei	H	EiPpPc
sba	M	Ei	H	EiPpPc
sbc	M	W	H	WPpPc
sh	H	(F)EaW(L)	H	EaWPpPc
ssa	H	FWL	S	WPpPcK
tb	M	(F)EaW(P)	H	EaWPpPcK
tba	H	(F)W	H	PpPcKS
tm	M	EaL(P)	H	EaPpPcK
tna	M	W	H	WPpPc
tnb	M	W	H	WPpPc
tr	H	REa(X)	S	R'EaPpPcK
wg	M	EaL	H	EaPpPc
wr	M	W	H	WPpPcK
xx	M		M	

Limitations to Major Road Construction

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