


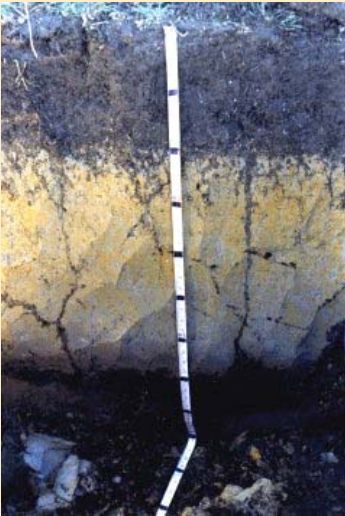




# Soils Of NZ: By Region

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Canterbury	Lismore Shallow and Stony Silt Loam	NZ: Pallic Orthic Brown Soil  USDA: Typic Dystrustept	0 - 20cm: Very dark greyish brown, silt loam, fine and very fine polyhedral structure.  20 - 30cm: Brown to dark brown, stony silt loam, weakly developed fine and very fine polyhedral structure.  30 - 50cm: Dark yellowish brown, very stony sandy loam, weakly massive structure.  50 - 120 cm: Dark brown to dark greyish brown weakly cemented very stony loamy sand layers alternating with olive loose very stony sand layers.	Lismore soils are formed from gravelly glacial outwash with a variable depth of silty loess deposit at the surface. The soil is well drained and has moderate to rapid permeability.  Without irrigation, the soil is very droughty and is used for extensive pastoral farming and Pinus Radiata plantations.  With irrigation the soil is used for intensive pastoral farming (dairy, deer, sheep) and for permanent horticultural crops (grapes, nut trees).	Occupies extensive gently sloping fans.	The most extensive soil occupying the Canterbury Plains.  Forms an association of soils on the south bank of major rivers - as loess depth increases Lismore soils merge into Chertsey soils then into Hatfield and Barrhill soils.  Grades into Ruapuna soils at 880 mm of annual rainfall.	
Canterbury	Tekoa Steepland Soil	NZ: Allophanic Firm Brown Soil  USDA: Andic Dystrudept	0 - 18 cm: Very dark greyish brown, silt loam, fine to extremely fine polyhedral structure.  18 - 35 cm: Yellowish brown, stony silt loam, fine to extremely fine polyhedral structure.  35 - 55 cm: Strong brown stony silt loam, fine to extremely fine polyhedral structure.  55 - 90 cm: Yellowish brown; stony silt loam, weakly developed coarse polyhedral structure.	Well drained, friable, acid soils with variable depth and stoniness. Mainly used for sheep farming but land with moderate slope angles has a high potential for forestry.  Weed invasion and lack of soil nutrients are major limitations to pastoral farming. A significant are of Tekoa soils occur under beech forest within the conservation estate.	Occurs on steep land derived from greywacke rocks, with rainfall of 900- 1500 mm and elevation of 450- 1400 m.	Occurs on the west of the extensive frontal mountain ranges. Very similar soil to Bealey steepland soils.  Grades into Hurunui soils at lower rainfall and into Kaikoura soils at higher elevation.	



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Canterbury	Templeton Silt Loam	NZ: Typic Immature Pallic Soil  USDA: Udic Haplustept	0 - 25 cm: Very dark greyish brown, silt loam, fine and very fine polyhedral structure.  25 - 35 cm: Olive brown to light olive brown, silt loam, weakly developed fine and very fine polyhedral structure, many inclusions of topsoil in worm burrows.  35 - 55 cm: Light olive brown, fine sandy loam, weakly massive structure.  55 - 70 cm: Light olive brown, mottled, silt loam, firm, massive.  70 - 200 cm: Olive loose very stony sand.	Lismore soils are formed from greater than 45 cm of fine-textured post-glacial alluvium. The soil is moderately well drained and has slow permeability in some subsoil horizons.  Without irrigation, the soil is droughty and is used for pastoral farming and mixed cropping.  With irrigation the soil is used for intensive pastoral farming and cropping and for a wide range of horticultural crops.	Occupies the older part (3000 - 10 000 years BP) of the post-glacial fan surface.	Occurs adjacent to large rivers on the Canterbury Plains. Commonly occurs in close association with shallow and stony Eyre soils.  Grades into imperfectly drained Wakanui soils in hollows and wherever water tables rise.	
Canterbury	Temuka Clay Loam	NZ: Typic Orthic Gley Soil  USDA: Mollic Endoaquept	0 - 20 cm: Very dark greyish brown, clay loam, coarse to fine polyhedral structure.  20 - 28 cm: Greyish brown, clay loam, coarse to fine polyhedral structure, many inclusions of topsoil in worm burrows.  28 - 50 cm: Grey with yellowish brown mottles, clay loam, very coarse polyhedral structure.  50 - 70 cm: Grey with yellowish brown mottles, clay loam, extremely coarse prismatic structure.  70 - 85 cm: Very dark greyish brown	Temuka soils are formed from thick deposits of fine-textured alluvium. The soil is poorly drained and has slow permeability in subsoil horizons when wet but has rapid permeability when cracks open in dry conditions.  The soil is used mainly for pastoral farming and a small proportion is used for mixed cropping.	Occurs in former swamps on the older part (5000 - 10 000 years BP) of the post-glacial fan surface.	Grades into imperfectly drained Wakanui soils on swamp margins and into Waimairi peat soils in low areas where water tables are highest.	

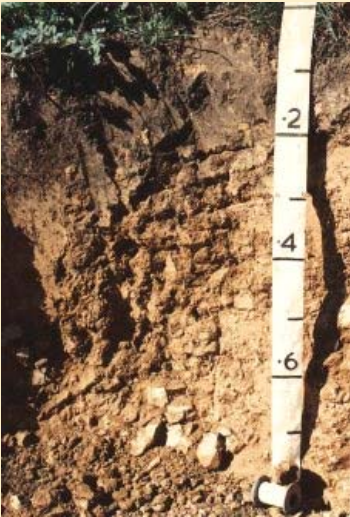

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Canterbury	Timaru Silt Loam	NZ: Mottled Fragic Pallic Soil  USDA: Udic Haplustept	0 - 16 cm: Dark greyish brown, silt loam, fine and very fine polyhedral structure.  26 - 28 cm: Light olive brown to dark greyish brown, silt loam, weakly developed medium and very fine polyhedral structure, many inclusions of topsoil in worm burrows.  28 - 40 cm: Light yellowish brown, silt loam, common mottles, weakly developed medium to coarse polyhedral structure.  40 - 60 cm: Pale olive, intensely mottled, silt loam, firm, medium to coarse	Timaru soils are formed from thick deposits of silty loess. The soil is imperfectly drained, with poorly drained inclusions on flat ridge tops. Fragipans (dense subsoil horizons that inhibit root growth and drainage) occur at 40 to 80 cm from the soil surface.  The soil is droughty and is susceptible to wind and rill erosion when cultivated. It is used for pastoral farming and mixed cropping.	Occupies the lower rainfall (<750 mm rainfall per annum) part of easy rolling to hilly downlands.	Occurs on the eastern part of the extensive downlands of North Otago and Canterbury.  Grades into more poorly drained Claremont and Opuha soils at higher rainfall.	

East Cape	Kiore Hill Soil	NZ: Typic Orthic Brown Soil  USDA: Typic Dystrochrept	0 - 12 cm: Dark greyish brown gritty silt loam.  12 - 30 cm: Yellowish brown to light olive brown gravelly silty clay loam with 10% weakly weathered angular mudstone fragments.  30 - 55 cm: Light olive brown gravelly silty clay loam with 10% weakly weathered angular mudstone gravels.  55 - 10 cm+: Olive yellow gravelly clay with 50% mudstone weakly weathered angular mudstone gravels.	The soil is formed from loose-jointed or 'frittered' mudstone and typically slumps easily, giving the landscape an irregular 'humpy' look, so typical of the East Coast of the North Island.  The soils tend to be 'fertile' with high levels of exchangeable cations (calcium, magnesium, potassium and sodium) and reserves of potassium and magnesium. Limitations to intensive agricultural therefore are not fertility but erosion and erosion potential and slope.	Hill country.	The soils occur throughout Poverty Bay. A wide range of soils occur on loose-jointed mudstone because of erosion. Close-jointed mudstone has less erosion and its landscape has more slips rather than slumps.  Locally, bentonic mudstone is extremely unstable. Soils formed from it are clayey and have grey colours in the subsoils indicating poor drainage.	
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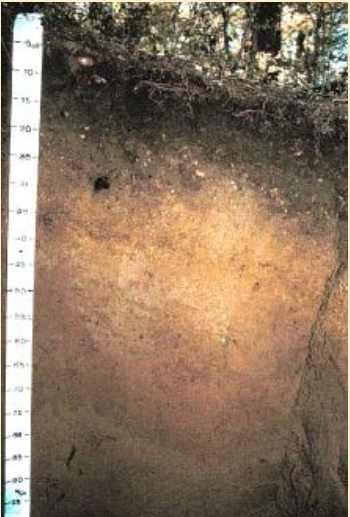





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East Cape	Kopuawhara Loamy Sand	NZ: Typic Orthic Allophanic  USDA: Typic Hapludand	0 - 17 cm: Black friable loamy sand.  17 - 31 cm: Dark yellowish brown loose loamy sand.  31 - 54 cm: Yellowish brown friable greasy sandy loam.  54 - 66 cm: Light grey soft sandy loam with many strong brown mottles.  66 - 100 cm+: Light brownish grey firm silty clay loam with common light grey mottles.	<p>The soil is formed from mainly weathered rhyolitic tephra (volcanic ash), which are mostly the sandy textured layers, overlying tertiary alluvium, which is the silty clay loam. The loamy sand layer (17 - 31 cm) is Waimihia Tephra (about 4300 years old). The soil grows excellent pastures and is used for beef and sheep farming.</p> <p>Typical for soil derived from weathered volcanic ash the phosphate retention is high, and exchangeable potassium and magnesium low.</p> <p>Pastures respond well to topdressing with potassic superphosphate. Some root restrictions could occur in the heavier, poorly drained subsoil.</p>	The soil occurs on high terraces.	<p>The soils occur west and south of Gisborne as far as Wairoa.</p> <p>Locally they grade into the imperfectly to poorly drained Mohaka loamy sand.</p>	

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East Cape	Oruataiaka Hill Soil	NZ: Typic Orthic Recent Soils  USDA: Typic Udorthent	<p>0 - 20 cm: Very dark greyish brown silt loam with few weakly weathered greywacke gravels.</p> <p>20 - 42 cm: Olive brown gravelly silt loam with many weakly weathered greywacke gravels.</p> <p>42 - 70 cm: Light olive brown gravelly silt loam with abundant weakly weathered angular greywacke gravels.</p>	<p>The soils are very stony as a result of extensive erosion. West of Ruatoria deeply eroded argillite is a good example of this, and the widely braided rivers such as the Waiapu are receiving great loads of eroded argillite and greywacke.</p> <p>The soils are only slightly acid. Available phosphate is low as is phosphate retention. This means that the soils respond well to phosphate topdressing.</p> <p>The soils tend to have high levels of exchangeable calcium and magnesium but low exchangeable potassium and sodium.</p>	Hilly land.	<p>The soils occur extensively in northern and western parts of the Gisborne - East Cape area. Soils of the Raukumara Range derived from greywacke are strongly leached with low nutrient levels.</p> <p>Allophanic soils from volcanic ash occur on stable ridges and spurs where some tephra remains.</p>	
East Cape	Waiherere Silt Loam	NZ: Weathered Fluvial Recent Soil  USDA: Mollic Udifluent	<p>0 - 20 cm: Very dark greyish brown friable silt loam.</p> <p>20 - 45 cm: Brownish yellow friable silt loam.</p> <p>45 - 64 cm: Brownish yellow firm fine sandy loam.</p> <p>64 cm +: Light olive brown firm fine sandy loam, few strong brown mottles.</p>	<p>The soil is formed from alluvium and occurs on river levees. Good physical properties and a warm climate make this a versatile soil. It is used for cropping (maize), horticulture(tomatoes, vegetables) and orchards (vineyards, Kiwi fruit) as well as grazing drystock.</p> <p>The soil has a moderately to strongly developed structure, well drained and there are no root barriers.</p> <p>Available water capacity is about 60mm over the upper meter. Naturally the soil is well supplied with plant available nutrients.</p>	The soils occur on the flood plains of major rivers on the Gisborne Plains and in Tolaga Bay.	<p>Waipaoa soils occur on terraces below the levees and flood frequently. Matawhero soils are similar but with deeper topsoils as a result of infrequent flooding.</p> <p>Makaraka soils are like the Matawhero soils but imperfectly drained. Makauri and Kaiti soils are the imperfectly to poorly drained former back swamp soils of the flood plain.</p>	



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East Cape	Whakawai Hill Soil	NZ: Typic Orthic Brown Soil  USDA: Umbric Dystrochrept	0 - 18 cm: Very dark greyish brown sandy loam with few sandstone fragments.  18 - 29 cm: Yellowish brown and 30% very dark greyish brown sandy loam with few sandstone fragments.  29 - 51 cm: Yellowish brown sandy clay loam with 10% strongly weathered sandstone fragments.  51 - 64 cm: Dark yellowish brown sandy clay loam with 20% strongly weathered sandstone fragments.  65+ cm: Dark yellowish brown weathered sandstone.	The soils are formed from calcareous sandstone, which on steep slopes, stands out in the landscape with its sharp contours. Moderate slip erosion occurs and slips heal slowly.  Analyses showed the weakly leached soil to have low calcium in the topsoil grading to high levels in the subsoil. Exchangeable magnesium and potassium were of medium to high value and sodium low. Available and reserve phosphorus are low.	Rolling to hilly with easy rounded contour.	Different kinds of sandstone occur throughout the Gisborne - East Cape area, the largest areas in the southern part. Such areas are generally regarded as the 'poorer type of country' and often planted in Pinus radiata.  Soils derived from massive non-calcareous sandstone have low exchangeable cation values especially in high rainfall areas where they are strongly leached.  Soils derived from banded sandstone and siltstone or mudstone have properties in between those of mudstone and sandstone.	
Hawkes Bay	Bluff Clay	NZ: Calcareous Orthic Melanic Soil  USDA: Typic Rendoll	0 - 30 cm: Very dark brown clay, strongly pedal, fine polyhedral macrofabric.  30 - 65 cm: Dark brown clay, strongly pedal, medium blocky macrofabric.  65 - 120+cm: White sandy limestone.	The soil is formed by weathering of the underlying limestone. There is a sharp boundary between the topsoil and the limestone. It is moderately deep and well drained. It is only used for pastoral farming because of the steepness of its slope.	Occurs on moderately steep hillsides, where limestone rock has not been covered by loess.	Located on limestone hills between Waipukurau and Havelock North. Associated soils are Te Onepu clay loam on undulating hilltops, and Matapiro sandy loam on rolling land.	


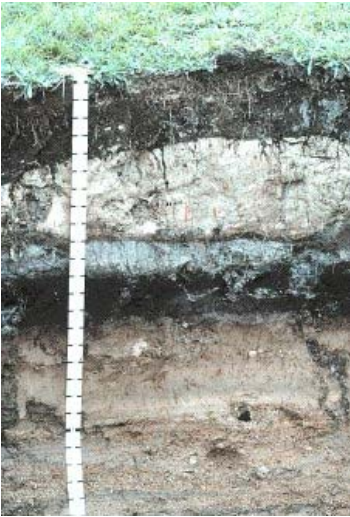



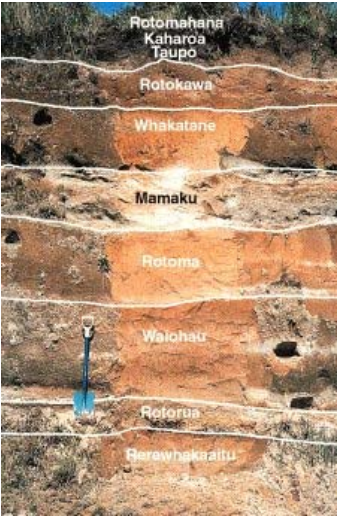
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Hawkes Bay	Kaweka Sandy Silt	NZ: Typic Impeded Allophanic Soil  USDA: Typic Hapludand	<p>0 - 18 cm: Dark brown humic sandy loam.</p> <p>18 - 32 cm: Dark yellowish brown and strong brown loamy coarse sand with many gravel-sized lapilli.</p> <p>32 - 38 cm: Dark yellowish brown sandy loam with many very fine gravel-sized lapilli.</p> <p>38 - 100+cm: Dark yellowish brown fine sandy loam.</p>	<p>This allophanic soil is developed in successive layers of airfall volcanic ash. The upper layers are relatively coarse textured, being formed from Taupo Tephra and Waimihia Tephra, while the lower layer is fine textured and strongly weathered.</p> <p>The slow permeability of the subsoil leads to perching of soil water for most of the time.</p> <p>The vegetation is native beech and kamahi forest, at an altitude of about 1000 metres. In many places the ash has been stripped by erosion, leaving the older, more weathered ash at the surface.</p>	Found on undulating to moderately steep hillsides.	Occurs extensively throughout the Kaweka mountains and hills between Kuripapango and Gisborne. Associated with very eroded forms, and with soils which have differing thicknesses of volcanic ash.	
Auckland/Coromandel	Puhi Clay Loam	NZ: Mottled-acidic Orthic Brown Soil  USDA: Mollic Haplaquept	<p>0 - 18 cm: Very dark brown clay loam, fine polyhedral structure.</p> <p>18 - 50 cm: Pale yellowish brown and pale grey clay, many mottles, medium polyhedral structure, clay coats on peds.</p> <p>50 - 75 cm: Pale brownish grey clay, abundant yellowish brown mottles, medium polyhedral structure, clay coats on peds.</p> <p>75 + cm: Pale grey soft sandstone, many coarse brown mottles.</p>	These have formed from weathered sandstone claystone that is often near the surface and influences the soil profile. They are imperfectly drained. Used for pasture and forestry. There is often a limitation of steep slope.	Found on hilly and rolling land.	Occurs around Waiwera, parts of hilly land in south Auckland and Coromandel.	

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Auckland/C oromandel	Waikare Clay	NZ: Perch-gleyed Albic Ultic Soil  USDA: Aquic Haplohumult	0 - 7 cm: Dark greyish brown clay loam, medium polyhedral structure.  7 - 17 cm: Light brownish grey clay loam, many yellowish brown mottles.  17 - 35 cm: Light grey clay, many yellowish brown mottles, coarse prismatic structure.  35 - 65 cm: Light grey and yellowish brown clay, coarse prismatic structure.	These have formed from weathered claystone and soils pugg easily. They are poorly or imperfectly drained. Low natural fertility.  Used for pasture but wintering pads to keep cattle of the soil when it is wet are needed. Trees are grown on these soils but performance is poor.	Found on rolling land.	Occurs around Warkworth, Wellsford, parts of hilly land in south Auckland and Coromandel.	
Auckland/C oromandel	Whangaripo Clay	NZ: Mottled Yellow Ultic Soil  USDA: Typic Hapludult	0 - 10 cm: Very dark grey clay, fine polyhedral structure.  10 - 45 cm: Pale yellowish brown clay, many reddish brown mottles, few clay coats on peds.  45 - 72 cm: Brownish yellow clay, many yellowish red mottles.  72 - 90 cm: Reddish yellow and red clay, medium polyhedral structure, few clay coats on peds.	These have formed from strongly weathered sandstone. They are moderately well drained. Low natural fertility. Used for pasture and well suited for forestry.	Found on rolling land.	Occurs around Warkworth, Wellsford, parts of hilly land in the Coromandel.	





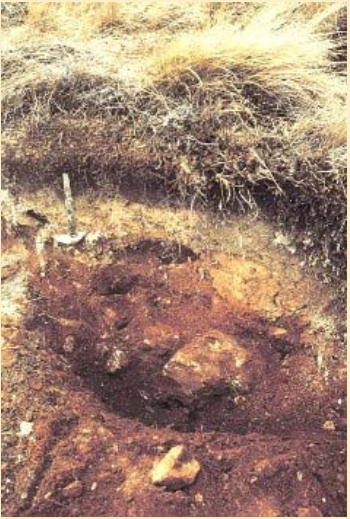

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Bay of Plenty	Mamaku Sandy Loam	NZ: Humose Orthic Podzol  USDA: Andic Haplohumod	0 - 8 cm: Black sandy loam.  8 - 15 cm: Greyish brown loamy sand.  15 - 43 cm: Dark reddish brown greasy silt loam.  43 - 58 cm: Strong brown greasy silt loam on Dark yellowish brown greasy silt loam.	The soil is formed from very thin Kaharoa and Taupo Tephra on Mamaku, Rotoma and Waiohau Tephra overlying thick RotoruaTephra with abundant fine pumice lapilli. This rests on ignimbrite. Podzol features such as a bleached layer under the topsoil and reddish subsoils, are common. The soil is used for plantation forestry, beef, deer and sheep farming.  Properties:The soil is strongly leached with low nutrient levels. High levels of phosphate retention.		The soil occurs on the Mamaku Plateau under 2000 mm annual rainfall. It grades into Ngongotaha and Oruanui soils with decreasing rainfall and increasing amounts of Taupo Pumice.	
Bay of Plenty	Opouriao Silt Loam	NZ: Weathered Fluvial Recent Soil  USDA: Dystric Fluventic Eutrochrept	0 - 23 cm: Black silt loam with moderately developed structure.  23 - 60 cm: Yellowish brown to olive brown fine sandy loam.  60 - 100 cm: Yellowish brown silt loam ver few yellowish brown mottles.	The soil is formed from alluvium derived from greywacke and tephra. It occurs in a warm climate and has a good natural fertility. One of the most versatile soils of New Zealand. Suitable for pastoral uses, horticulture or cropping. Flooding is rare.  Properties: The soil is well drained with moderately deep black topsoils. It is moderately leached with good levels of exchangeable calcium, magnesium and potassium. Reserves of potassium, magnesium and phosphorus are of high value.	The soil occurs on levees on the Opotiki and Rangitaiki Plains. Rangitaiki and Ruatoki soils occur on lower terraces and naturally flood frequently.  Associated former back swamps have Otara soils or Paroa soils developed on them.		



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Bay of Plenty	Papamoa Loamy Sand	NZ: Typic Sandy Recent Soil  USDA: Typic Udipsamment	<p>0 - 12 cm: Black loamy sand.</p> <p>12 - 21 cm: Dark brown loamy sand, few very fine Kaharoa lapilli.</p> <p>21 - 30 cm: Dark yellowish brown sand with few Taupo lapilli on White to very pale brown sand.</p>	<p>The soil is derived from wind-blown sand with small amounts of tephra in the upper horizons.It is used for winter grazing of cattle and sheep in association with wetter soils.Also urban development and recreation.</p> <p>Properties: Excessively drained soil with low amounts of plant-available water and nutrients. Potential of wind erosion</p>		<p>Coastal areas from Katikati to Opotiki. Similar soils on the Rangitaiki plains have more tephra in the upper horizons.</p> <p>Ohope soils occur closer to the ocean with less profile development (thinner or no topsoil, raw dune sand in the subsoil).</p> <p>Kairua soils occur further inland often with a humus/iron pan in the subsoil formed by indigenous forests.</p>	
Bay of Plenty	Paroa Silt Loam	NZ: Acid Recent Gley Soils  USDA: Andic or Aquic Dystrochrept	<p>0 - 18 cm: Very dark brown silt loam with coarse sand (Tarawera Tephra) in the upper 5 cm.</p> <p>0 - 18 cm: Very dark brown silt loam with coarse sand (Tarawera Tephra) in the upper 5 cm.</p> <p>44 - 49 cm: Very dark brown silt loam (buried topsoil)</p> <p>49 - 61 cm:Light grey sand (Kaharoa Tephra).</p> <p>61 - 76 cm: Very dark brown peat.</p> <p>76 - 91 cm:Yellowish brown islt loam on Brown and pale olive sand with pumice</p>	<p>Typical layered soil of the former backswamps of the Rangitaiki Plains derived from tephra,alluvium and peat. The soil is in pasture used for dairying,beef and some sheep farming.</p> <p>Properties: The poorly drained soil becomes moderately well drained with artificial drainage. Slow permeability in the subsoil. High water tables in winter. High levels of organic matter and exchangeable calcium, magnesium and potassium in the topsoil. Low phosphorus levels.</p>		<p>Paroa soils occur throughout the Rangitaiki Plains with several subtypes mapped depending on subsoil layers (Paroa silt loam on peat, peat over gravels) and topsoil textures.</p>	

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Bay of Plenty	Rotomahana Loam	NZ: Typic Tephric Recent Soil  USDA: Typic Udorthent	<p>0 - 7 cm: Very dark brown loam, friable with moderately developed structure.</p> <p>7 - 50 cm: Light olive grey friable silt loam with weakly developed soil structure.</p> <p>50 - 67 cm: Light olive grey slightly firm silt loam.</p> <p>67 - 78 cm: Pale olive slightly firm sandy loam.</p> <p>78 - 87 cm:Black sandy loam (buried topsoil of Taupo Pumice).</p>	<p>The soil was formed during the 1886 Trawera eruption from hydrothermally altered rhyolitic ejecta from Lake Rotomahana.Its youth is reflected in very shallow topsoils with low levels of organic matter.It is used for dairying, beef and sheep farming.</p> <p>Properties:This is one of the few soils derived from volcanic ejecta in New Zealand that can be called fertile. It has high levels of exchangeable and reserve magnesium and potassium.High to medium calcium and available phosphorus.However, the soil tends to compact easily and is therefore not suited to intensive cropping.</p>		Mostly west of Mt Tarawera and east of Rotorua on rolling to hilly land. Tarawera Tephra erupted mostly east of Mt Tarawera and it is the parent material of infertile soils	
Bay of Plenty	Te Ngae Road	NZ: TBA  USDA: TBA		TBA	Location: North-eastern side of Lake Rotorua, Te Ngae Road about 350 m north of the Whakatane turn-off.		







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Bay of Plenty	Te Puke Sandy Loam	NZ: Typic Orthic Allophanic Soil  USDA: Typic Hapludand	<p>0 - 18 cm: Black friable sandy loam.</p> <p>18 - 60 cm: Dark yellowish brown sandy loam.</p> <p>60 - 94 cm: Yellowish brown and yellow friable coarse sandy loam on Yellowish brown gritty silt loam.</p>	<p>The soil is formed from weathered rhyolitic tephra (very thin Kaharoa and Taupo Tephra, on Mamaku, Rotoma, Rotorua Tephra on older rhyolitic tephra).</p> <p>Good physical properties and a warm climate make this a versatile soil. It is used for orchards (Kiwi fruit, citrus), dairying, beef and sheep farming.</p>	<p>The soil has weakly developed soil structures and there are no root barriers. The soil is free draining yet has very high soil-water storage levels.</p> <p>Low magnesium and potassium levels and medium phosphate retention are typical.</p>	<p>The soils occur on dissected tephra-covered surfaces in western Bay of Plenty. Paengaroa soils occur further east and are sandier and Katikati soils occur further to the west and have finer textures. Opotiki soils are similar.</p>	
Canterbury	Hurunui Hill and Steepland Soil	NZ: Acidic Orthic Brown Soil  USDA: Typic Dystrudept	<p>0 -18 cm: Very dark greyish brown, silt loam, fine and very fine polyhedral structure.</p> <p>18 - 35 cm: Dark yellowish brown, stony silt loam, very fine to medium polyhedral structure, many inclusions of topsoil in worm burrows.</p> <p>35 - 95 cm: Yellowish brown, stony to very stony silt loam, fine to coarse polyhedral structure.</p> <p>95 + cm: Shattered rock.</p>	<p>Well drained, friable, weakly acid soils with variable depth and stoniness. Mainly used for sheep farming but land with moderate slope angels has a high potential for forestry. Woody and scrubby weed invasion is a major limitation to pastoral farming.</p>	<p>Occurs on hilly and steepland derived from greywacke rocks, with rainfall of 700-1200 mm and elevation of 150-900 m.</p>	<p>Occurs on the extensive frontal mountain ranges, east of the Canterbury high country.</p> <p>Grades into Haldon soils at lower rainfall and into Kaikoura and Tekoa steepland soils at higher elevation, or under colder climate, to the west.</p>	

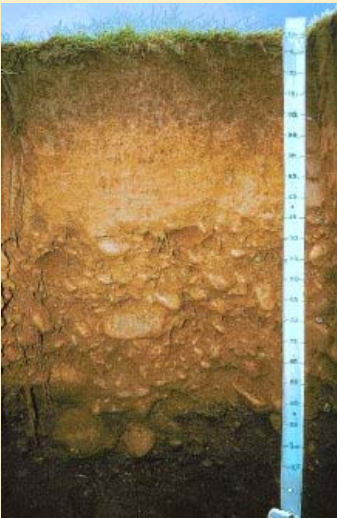

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Canterbury	Lewis Steepland Soil	NZ: Typic Orthic Podzol Soil  USDA: Andic Haplorthod	0 - 12 cm: Dark brown, silt loam, very fine to extremely fine polyhedral structure.  12 - 22 cm: Pale brown, stony silty clay loam, weakly developed fine to extremely fine polyhedral structure.  22 - 60 cm: Strong brown stony silty clay loam, fine to extremely fine polyhedral structure.  52 - 85 cm: Dark brown and dark reddish brown, very stony sandy loam, massive.  85 + cm: Olive brown, very stony loamy	Well drained, extremely acid soils with distinctive profile features including thin topsoils overlying pale eluvial horizons, overlying rich brown to reddish brown subsoils with high iron, aluminium and humus coatings.  Almost all Lewis soils occur under beech forest within the conservation estate.	Occurs on steep slopes under beech forest with rainfall of 1800-5000 mm and elevation of 450-1400 m.	Occurs on lower steep slopes of the Southern Alps to the east of the main divide.  Grades into Kaikoura soils or alpine soils at higher altitude, and into Tekoa or Bealey soils at lower rainfall.	
Hawkes Bay	Omahu Gravelly Sandy Loam	NZ: Typic Fluvial Recent Soil  USDA: Typic Ustifluvent	0 - 5 cm: Dark brown gravelly sandy loam.  5 - 18 cm: Olive brown gravelly sand, single grain apedal.  18 - 150+cm: Vvery dark greyish brown sandy gravel, single grain apedal.	Formed in recent alluvial sand and gravel, this soil is very permeable and highly aerated. It is an excessively drained and droughty soil used for viticulture. Note the thin topsoil, and the fluvial bedding in the gravel. Irrigation is essential on this soil type.	Occurs on former river courses, and on floodplains where stopbank protection has allowed development of a distinct topsoil.	Found in the Gimblett Road area of the Heretaunga Plains, and also alongside the three main rivers.  Associated with the deeper Omarunui soils, and with the imperfectly drained Flaxmere soils. Older Twyford and Hastings soils are found nearby, on higher and flood-free land.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Hawkes Bay	Pakipaki Silt Loam	NZ: Typic Sandy Gley Soil  USDA: Aquandic Humaquept	<p>0 - 18 cm: Very dark greyish brown silt loam, moderately pedal, medium blocky macrofabric.</p> <p>18 - 25 cm: Dark grey fine sandy loam, moderately pedal, fine blocky macrofabric.</p> <p>25 - 38 cm: Grey fine sand, weakly pedal pedal.</p> <p>38 - 42 cm: Light brownish grey coarse sand and gravel-size pumice, single grain apedal.</p> <p>42 - 70 cm: Greyish brown fine sand;</p> <p>70 - 110+cm: Grey fine sand and gravel-size pumice.</p>	<p>This soil is formed in pumice alluvium deposited after the Taupo Pumice volcanic eruption approximately 2000 years before present.</p> <p>This example has poor drainage, caused both by slow subsoil permeability in the closely packed and structureless fine sand, and also by a high watertable.</p> <p>Note the current bedding in the subsoil layers. Also note the groundwater seeping out from about 85 cm depth. Currently used for pastoral farming and cropping.</p>	Occurs on the alluvial plain.	Found on the the southwestern part of the Heretaunga Plains. Associated with Te Awa soils, which have greater thicknesses of greywacke-derived soil overlying the pumice sand, and also with the very poorly drained Turamoe peaty loam.	
Hawkes Bay	Poporangi Sandy Loam	NZ: Mottled Duric Pallic Soil  USDA: Typic Durustalf	<p>0 - 19 cm: Very dark brown sandy loam.</p> <p>19 - 28 cm: Greyish brown sandy loam with common brown mottles and many worm-channels.</p> <p>28 - 34 cm: Light brownish grey loamy sand with common brown mottles, weakly pedal.</p> <p>34 - 45 cm: Yellowish brown clay loam with many greyish brown mottles and common dark brown clay coatings, strongly pedal, coarse blocky macrofabric.</p> <p>45 - 100+cm: Olive brown sandy loam,</p>	<p>This soil is old enough that distinctive horizonation has formed. Note the worm-mixing below the dark topsoil, the pale leached layer above the clay, and the hard duripan which is very difficult to dig into. It is an imperfectly drained soil, with water perching above the clay and the duripan layers.</p> <p>Mostly used for pastoral farming, although may be used for viticulture if the duripan can be disrupted by deep ripping the soil.</p>	Occurs on ancient alluvial plains and terraces.	Found on older parts of the Heretaunga Plains and throughout Central Hawkes Bay. Associated with Ngatarawa sandy loam and Takapau sandy loam.	






Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Hawkes Bay	Takapau Sandy Loam	NZ: Typic Orthic Allophanic Soil  USDA: Andic Ustochrept	<p>0 - 25 cm: Very dark brown sandy loam.</p> <p>25 - 63 cm: Dark yellowish brown allophanic sandy loam with common dark reddish brown coatings on pores, very friable failure.</p> <p>63 - 120+cm: Dark yellowish brown sandy gravel, single grain apedal.</p>	<p>Formed in ancient alluvial silt and gravel with additions of volcanic ash, and quite strongly weathered. Moderately rapidly permeable soil material over very permeable gravels. A somewhat excessively drained and droughty soil very suited to viticulture.</p> <p>Note the abundant roots in the gravel layer. The sandy loam topsoil is very susceptible to wind erosion.</p>	Occurs on alluvial plains and elevated river terraces.	Found on the Heretaunga Plains and throughout Central Hawke_s Bay. In association with Poporangi sandy loam, deeper and with a duripan, and also with the non-allophanic Ngatarawa sandy loam.	
Marlborough/Nelson	Awatere Shallow Sandy Loam	NZ: Typic Fluvial Recent Soil  USDA: Typic Ustifluent	<p>0 - 15 cm: Ddark greyish brown gravelly sandy loam, weakly pedal, coarse blocky macrofabric.</p> <p>15 - 90+cm: Ddark olive grey sandy gravel, single grain apedal.</p>	<p>Formed in recent alluvial sand and gravel, this soil is very permeable and highly aerated.</p> <p>It is an excessively drained and droughty soil used for viticulture. Note the roots at 50-55 cm, exploiting moisture held in a thin sand lens. Irrigation is essential on this soil type.</p>	Occurs on river floodplains, but where stopbank protection has allowed development of a distinct topsoil.	Found alongside the Wairau and Awatere Rivers in Marlborough. Associated with the deep Gibsons soils. Slightly older Wairau and Rapaura soils are found nearby, on slightly higher and flood-free land.	

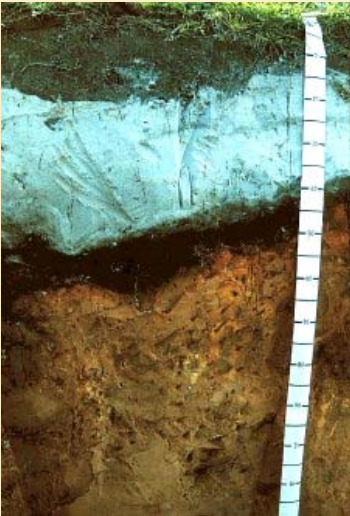

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Marlborough/Nelson	Grovetown Deep Clay Loam	NZ: Mottled Fluvial Recent Soil  USDA: Aquic Dystrochrept	<p>0 - 25 cm: Dark grey clay loam, moderately pedal, coarse blocky macrofabric.</p> <p>25 - 65 cm: Grey heavy silt loam with many strong brown mottles, moderately pedal, medium blocky plus fine polyhedral macrofabric.</p> <p>65 - 115 cm: Grey fine sandy loam with many dark yellowish brown mottles, weakly pedal.</p> <p>115 - 130+ cm: Grey sandy loam with many olive brown and light brownish grey mottles, massive apedal.</p>	<p>This imperfectly drained soil is developed in deep alluvial and predominantly fine-textured sediments. It has limitations caused by some perching of water in the heavy silt loam layer, as well as high groundwater influence.</p> <p>This soil is well suited to market gardening, and is also used for pipfruit production. Quite large areas are still being pastorally farmed.</p>	Found on lower parts of alluvial plains, near areas of natural springs.	Occurs on the Wairau plains, near to Spring Creek. Associated soils are the poorly drained Spring Creek soils, and the well drained Wairau soils.	
Marlborough/Nelson	Mapua Fine Sandy Loam	NZ: Mottled Yellow Ultic Soil  USDA: Aquic Hapludult	<p>0 - 28 cm: Dark greyish brown fine sandy loam, weakly pedal, coarse blocky macrofabric.</p> <p>28 - 55 cm: Brownish yellow clay loam with many strong brown mottles and dark reddish brown organic coatings, weakly pedal, medium blocky macrofabric, few weathered pebbles.</p> <p>55 - 88 cm: Strong brown clay loam with many light brownish grey mottles and pale brown organic coatings, weakly pedal, coarse prismatic macrofabric, few weathered pebbles.</p>	<p>This is a strongly weathered soil formed in ancient weathered gravels. It has low pH and very low nutrient levels. It is also slowly permeable, leading to considerable wetness during wet seasons.</p> <p>It is classed as imperfectly drained, and artificial drainage is required, as much of the Nelson apple crop is produced on this soil type. Past land use practices have led to severe topsoil erosion.</p>	Found on slopes and crests in rolling landscapes.	This soil occurs primarily on the Moutere Gravels geological formation near Nelson. It is associated with the Mapua hill soils on hilly land, and with the Braeburn soils of the adjacent valley floors.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Marlboroug h/Nelson	Rapaura Shallow Silt Loam	NZ: Typic Fluvial Recent Soil  USDA: Mollic Ustifluvent	<p>0 - 22 cm: Very dark greyish brown silt loam, moderately pedal, medium polyhedral macrofabric.</p> <p>22 - 45 cm: Olive brown fine sandy loam, massive apedal.</p> <p>45 - 110+ cm: Dark greyish brown sandy gravel, single grain apedal.</p>	<p>This shallow soil is formed in recent alluvial sediment, and has sufficient age that topsoil is well developed and there is some weathering of the subsoil, causing brown rather than grey colours.</p> <p>The topsoil and subsoil are moderately permeable, and the gravel is very permeable. The soil is somewhat excessively drained, and is ideal for viticulture.</p>	Occurs on alluvial plains, some distance from the river course, and free from flood risk.	Found in the Wairau and Awatere Valleys of Marlborough. Associated with deeper Wairau soils. Younger Awatere and Gibsons soils are located nearer the river courses.	
Marlboroug h/Nelson	Seddon Silt Loam	NZ: Typic Immature Pallic Soil  USDA: Udic Ustochrept	<p>0 - 23 cm: Very dark greyish brown silt loam, weakly pedal, fine polyhedral macrofabric.</p> <p>23 - 55 cm: Yellowish brown silt loam, weakly pedal, medium blocky macrofabric.</p> <p>55 - 85 cm: Yellowish brown fine sandy loam, incipient fragipan.</p> <p>85 - 98 cm: Olive brown fine sandy loam with many strong brown mottles.</p> <p>98 - 160+cm: Clay coated and sandy gravel.</p>	This moderately deep soil is formed in loess (wind-deposited sediment) over alluvial gravel. The fragipan is not sufficiently developed to cause perching of water or restriction of roots. Some mottling is found in the lowest fine earth layer, where water perches before draining into the gravel. The soil is moderately well drained. Although previously only used for dryland pastoral farming, large areas of this soil type are now being used for viticulture.	Occurs on intermediate height river terraces.	This soil is found predominantly on southern terraces of the Awatere River. It is associated with the shallow and stony Dashwood soils, and the slightly older Seaview soils which are formed in deeper loess deposits.	





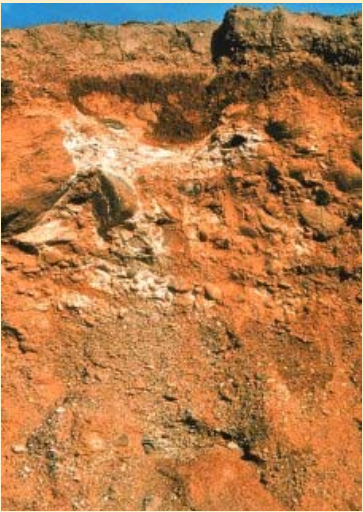

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Marlboroug h/Nelson	Wairau Deep Silt Loam	NZ: Typic Fluvial Recent Soil  USDA: Mollic Ustifluvent	<p>0 - 24 cm: Very dark greyish brown silt loam, weakly pedal, medium blocky macrofabric.</p> <p>24 - 40 cm: Olive brown fine sandy loam, weakly pedal, fine blocky macrofabric.</p> <p>40 - 48 cm: Dark greyish brown loamy sand, single grain apedal.</p> <p>48 - 74 cm: Olive brown fine sandy loam;</p> <p>74 - 106 cm: Olive sand.</p> <p>106 - 120+cm: Sandy gravel</p>	This deep soil is formed in recent alluvial sediment which overlies gravel. The soil is moderately rapidly permeable, and also stores large quantities of soil water. It is well drained, and is very suitable for most horticulture. It is used for viticulture, but tends to cause high vigour.	Found on alluvial plains, far enough from the river courses, or elevated sufficiently to be free from flood risk.	Found in the Wairau and Awatere Valleys of Marlborough. Associated with shallow Rapaura soils, and imperfectly drained Grovetown soils. Younger Awatere and Gibsons soils are located nearer the river courses.	
Northland	Kerikeri Friable Clay	NZ: Orthic Typic Oxidic Soil  USDA: Typic Haplohumult	<p>0 - 15 cm: Dark brown heavy silt loam, fine polyhedral structure.</p> <p>15 - 27 cm: Dark brown clay loam with hard concretions.</p> <p>27 - 45 cm: Dark brown clay loam, coarse block structure, few hard concretions.</p> <p>45 - 72 cm: Dark brown clay loam, medium block structure, few weathered basalt fragments.</p> <p>72 - 110 cm: Dark brown clay, fine block structure, many concretions and</p>	The soil is formed in strongly weathered basalt, is well drained and can dry out rapidly over summer. Low natural fertility. Suited to pasture and horticulture. Horticultural crops often need irrigation.	Found on flat to gently undulating surfaces of ancient basalt flows.	Occur in the vicinity of Kerikeri and often associated with Okaihou soils.	


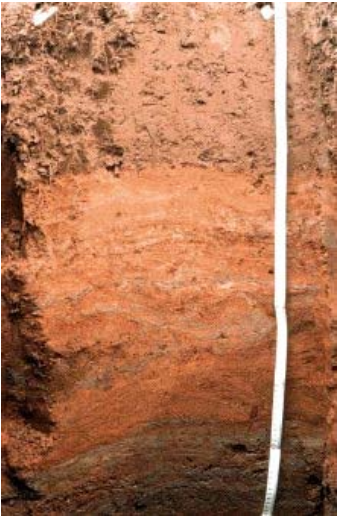
Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Northland	Okaihau Gravelly Clay	NZ: Nodular Typic Oxidic Soil  USDA: Orthoxic Palehumult	0 - 22 cm: Dark greyish brown gravelly silt loam, medium polyhedral structure.  22 - 61 cm: Brown clayey gravel (up to 60 mm diam.) of hard concretions.  61 - 70 cm: Dark brown clay loam, fine block structure, many fine hard concretions, few clay coatings.  70 - 89 cm: Dark yellowish brown gravelly clay loam, few fine concretions.	The soil is formed in strongly weathered basalt, is well to moderately well drained and can dry out rapidly over summer. Low natural fertility. Suited to pasture and horticulture. Horticultural crops often need irrigation and may require drainage.	Found on flat to gently undulating surfaces of ancient basalt flows.	Occur in the vicinity of Kerikeri and often associated with Kerikeri soils. Some Okaihau soils can have impeded drainage and their subsoils look "greenish" (dark greyish brown). Generally they have more gravel and coarser structure than Kerikeri soils.	
Northland	Papakauri Silt Loam	NZ: Typic Orthic Allophanic Soil  USDA: Acrudoxic Hapludand	0 - 15 cm: Dark reddish brown silt loam.  15 - 32 cm: Dark red gritty silt loam, fine blocky structure.  32 - 54 cm: Dark red silt loam, medium polyhedral structure.  54 - 85 cm: Dark red clay loam, fine polyhedral structure.  85 - 111+ cm: Yellowish red clay loam, coarse polyhedral structure.	The soil is red in colour, including the topsoil. They are friable well drained soils and can dry out rapidly in summer. Suited to a variety of uses such as pasture, cropping and horticulture. They are physically resilient soils and require high levels of P fertiliser.	Found on flat to gently undulating surfaces of land around the perimeter of basalt cones.	Not a common soil. Found in the vicinity of Kaikohe and Whangarei.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Northland	Te Kopuru Sand	NZ: Humus-pan Densipan Podzol  USDA: Typic Duraquod	<p>0 - 15 cm: Grey loamy sand.</p> <p>15 - 40 cm: White sand, loose single grain structure.</p> <p>40 - 50 cm: Black cemented sand, massive, very hard, strongly indurated.</p> <p>50 - 80 cm: Brownish yellow sand, massive, hard, weakly indurated.</p> <p>80 - 110+ cm: Brownish yellow sand, massive, very firm, weakly indurated.</p>	The soil has a hard shallow pan which restricts roots and drainage. It has formed under Kauri vegetation on old sand dunes. It has very low natural fertility. Becomes very wet in winter and very dry in summer. Suited to pasture. One of the most difficult soils.	Found on flat to gently undulating surfaces of rolling land which was once sand dunes or sand blown inland.	Common particularly on the west coast and inland of Ninety Mile Beach which were under former Kauri forest.	
Northland	Waimate North Heavy Silt Loam	NZ: Typic Orthic Oxidic Soil  USDA: Andeptic haplohumult	<p>0 - 13 cm: Dark red heavy silt loam.</p> <p>13 - 23 cm: Dark red silt loam, fine polyhedral structure.</p> <p>23 - 44 cm: Dark red clay loam, medium polyhedral structure.</p> <p>44 - 58 cm: Dark red clay loam, fine polyhedral structure.</p> <p>58 - 91+ cm: Dark red clay, fine block structure.</p>	The soil is red in colour, including the topsoil. They are friable well drained soils and can dry out rapidly in summer. Suited to a variety of uses. Well suited to dairy farming and horticulture, however irrigation may be needed for some crops.	Found on gently undulating surfaces of land formed from weathered scoriacious basalt.	Found in the vicinity of Kaikohe and often associated with Papakauri soils.	






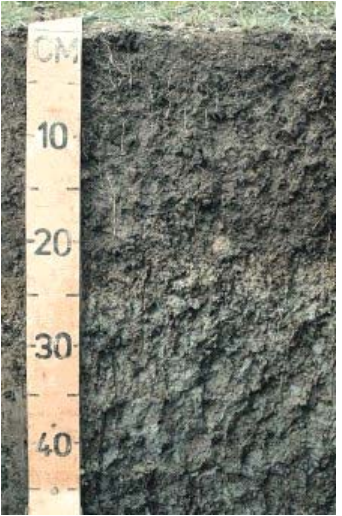
Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Northland	Wharekohe Silt Loam	NZ: Densipan Perched-gley Ultic Soil  USDA: Typic Albaquult	0 - 18 cm: Greyish brown loamy silt.  18 - 27 cm: Pale brown clay, few grey mottles, firm, coarse polyhedral structure.  27 - 62 cm: White clay, massive, firm, brown coatings on vertical partings.  62 - 85 cm: White clay, massive, brown coatings on vertical partings.  85 - 110 cm: White silty clay, massive, many yellowish brown mottles.	The soil is formed in strongly weathered mudstone, is poorly drained and has very low natural fertility. Becomes very wet in winter and is easily pugged. A very hard cemented pan can also be present just below the surface. Suited to pasture. One of the most difficult soils to grow a crop on.	Found on flat to gently undulating surfaces of the rolling hilly land.	Common throughout Northland especially under former Kauri forest. There is also a sandy loam type.	
Southland	Dunstan	NZ: Typic Allophanic Brown Soil  USDA: Andic Lithic Dystrochrept	0 - 15 cm: Very dark greyish brown silt loam with 10% gravel, earthy, apedal.  15 - 40 cm: Yellowish brown silt loam with 40% gravel, earthy, apedal, non-sticky.  40+ cm: Jointed schist rock.	The soil is formed in schist colluvium on schist rock, is well drained and has high phosphate retention. The soil is similar to Allophanic Soils of the North Island formed from volcanic ash. Low natural fertility.	Found on steep land of the Otago Ranges.	Occur at mid to high altitudes in the Central Otago Region.	


Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Southland	Lowburn Loamy Sand	NZ: Typic Aged-argillic Semiarid Soil  USDA: Arenic Haplargid	0 - 8 cm: Dark grey gravelly sand, massive, single grained.  8 - 32 cm: Yellowish brown gravelly coarse sand.  32 - 50 cm: Strong brown gravelly sandy loam, compact, gravel cemented with clay very firm and with boulders, white carbonate deposits.  50+ cm: Dark brown stoney and bouldery loamy coarse sand, weakly cemented and firm.	The soil is formed in loess over alluvium of sand, gravel and boulders. There is carbonate accumulation in the soil profile. The climate is very dry and it is a difficult soil to farm despite high natural fertility.	Found on flat to gently undulating surfaces of high terraces.	An uncommon soil. Occurs in the Alexandra area.	
Southland	Oamaru Shallow Clay Loam	NZ: Typic Rendzic Melanic Soil  USDA: Lithic Rendoll	0 - 5 cm: Black calcareous clay loam, fine spheroidal structure, friable, non-sticky.  5 - 20 cm: Very dark brown calcareous clay loam, friable, non-sticky, fine polyhedral structure, few limestone fragments.  20 - 32 cm: Dark brown calcareous gravelly clay loam, friable, slightly sticky, fine and medium polyhedral structure, many limestone fragments.  32+ cm: Hard, massive, jointed limestone.	The soil is formed in hard limestone, is excessively drained with rapid permeability and can dry out rapidly over summer. Moderate natural fertility with alkaline pH. The shallow soil depth is a limitation to many uses. Suited to pasture.	Found on flat to gently undulating surfaces of mesas, crests of scarps of limestone country. Under tussock grassland or grazing.	Occur in the vicinity of the Ngapara district, Enfield-Te Aneraki district. Associated with othe Oamaru soils on hill slopes and with shallow loess coverings. Also Roseberry steepland soils which are formed from limestone.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Southland	Opuha Silt Loam	NZ: Mottled Fragic Pallic Soil  USDA: Aquic Fragiochrept	0 - 20 cm: Very dark greyish brown silt loam, firm, fine polyhedral structure.  20 - 30 cm: Pale brownish grey silt loam with many mottles, firm.  30+ cm: Yellowish brown silt loam with grey and brown mottles, very firm, compact, coarse prismatic structure.	The soil is formed in loess, is poorly drained and has low natural fertility. Becomes very wet in winter and is easily pugged, drainage is often essential. Suited to pasture.	Found on strongly rolling hilly land.	Occur on the foothills bordering the steeplands in the vacinity of Orari Gorge, near Hampden and the Fairlie District. They grade eastward into Claremont soils and westward into Kakahu soils.	
Southland	Pomahaka Loamy Silt on Sandy Loam	NZ: Fluvial Recent Soil  USDA: Typic Udifluvent	0 - 27 cm: Dark greyish brown loamy silt, medium polyhedral structure.  27 - 44 cm: Light olive brown sandy loam, massive single grain structure.  44 - 62 cm: Light yellowish brown sandy loam, massive single grain structure.  62+ cm: Dark greyish brown sandy loam, massive single grain structure.	The soil is formed in silty and loamy alluvium, often over gravel. The soil is sandy, well drained and has moderate natural fertility. Buried topsoils may also be present. Highly suitable for horticulture with many areas in pasture. Stopbanks have decreased the flooding risk.	Found on flat to gently undulating surfaces of levees and fans.	Occur on the Taieri Plains. There are several Pomahaka soil types mainly seperated on sand size.	







Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Southland	Te Anau Sandy Loam	NZ: Fragic Allophanic Brown Soil  USDA: Andic Dystrochrept	0 - 20 cm: Very dark grey sandy loam, friable, fine spheroidal and polyhedral structure.  20 - 43 cm: Dark yellowish brown sandy loam, friable, fine spheroidal and polyhedral structure.  43 - 67 cm: Dark yellowish brown sandy loam, friable, fine spheroidal structure, many gravels.  67+ cm: Light olive brown boulders, gravel and sand, compact.	The soil is formed from gravelly glacial moraine, is well drained and has very low natural fertility. Suited to pasture and tussock grasses or forestry. The soils have high P retention and are droughty. They are liable to serious erosion when cultivated and are unsuitable for cropping. Boulders on the surface can also be a problem in some areas.	Found on ridges of moraine.	Occur in the lowland areas of the Te Anau Basin, southeast of Lake Te Anau. There is also a hill soil on steeper slopes.	
Taranaki/M anawatu	Egmont Black Loam	NZ: Typic Orthic Allophanic Soil  USDA: Typic Hapludand	0 - 20 cm: Black loam, very fine polyhedral structure; friable.  20 - 38 cm: Dark yellowish brown loam; very friable; fine polyhedral structure.  38 - 55 cm: Dark yellowish brown loam; very friable; medium polyhedral structure.  55 - 89 cm: Dark yellowish brown silt loam; friable; dark brown humic cutans; coarse polyhedral structure.  89 - 147 cm: Yellowish brown silt loam; firm; fine and medium polyhedral structure.	The soil is formed from andesitic tephra erupted mainly from Mt Taranaki. Egmont soils are well drained with a rapid permeability in the topsoil and a moderate to moderately rapid permeability in the subsoil. Very suited to grassland farming, forestry, market gardening and green-feed cropping, with a little barley cropping south of Waverley. Egmont soils have a very low structural vulnerability and a high resilience. This is due, in part, to the high proportion of allophane present, and to the stabilisation of soil organic matter by the formation of organo-mineral complexes. The soil, as a result, can be grazed or cropped intensively with little decline in soil quality.	Occurs on flat and rolling country where andesitic tephra has mantled ancient marine terrace remnant surfaces.	Found on flat and rolling land along the central west coast of the North Island. Associated with well-drained Westmere silt loams and Parakino sandy loams to the south and Egmont brown loam, and Stratford and New Plymouth soils to the north.	



Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Taranaki/M anawatu	Foxton Black Sand	NZ: Typic Sandy Brown Soils  USDA: Typic Udipsamment	<p>0 - 25 cm: Black loamy sand, fine polyhedral structure.</p> <p>25 - 40 cm: Yellowish brown sand; very fine blocky structure.</p> <p>40 - 65 cm: Olive brown loose sand, single grain.</p> <p>&gt; 65 cm: Light olive brown grading to grey loose sand; single grain.</p>	The soil is formed from weakly weathered wind-blown sand that is often severely water-repellent in the upper part of the topsoil. Foxton soils are somewhat excessively drained and have a rapid to very rapid permeability. Suited to forestry and intensive grazing, and especially useful as wintering country for stock. The soils are, however, drought prone and susceptible to wind erosion if exposed.	Occurs on sand dunes.	Found on the older, more consolidated inland dunes of the sand country. Associated with Awahou loamy sands and sandy loams of the flat, higher parts of the older sand plains (somewhat excessively drained), the Carnarvon black and brown sandy loams and loamy sands of the flat, lower lying older sand plains (imperfectly and poorly drained), and the very poorly drained Omanuka peaty loams and peaty silt loams of the flat peaty swamps.	
Taranaki/M anawatu	Kairanga Silty Clay	NZ: Typic Orthic Gley Soil  USDA: Typic Endoaquept	<p>0 - 20 cm: Dark grey silty clay; fine polyhedral structure with many Fe/Mn concretions at the boundary to the horizon below.</p> <p>20 - 35 cm: Grey silty clay; fine and medium blocky structure with abundant strong brown and dark brown mottles.</p> <p>35 - 60 cm: Grey silty clay; coarse to very coarse prismatic structure with many strong brown reddish brown mottles.</p> <p>&gt; 60 cm: Grey clay; very coarse blocky to massive structure; common strong brown mottles.</p>	The soil is formed from moderately weathered, fine-textured quartzo-feldspathic sediment washed down off the Ruahine and Tararua Ranges and deposited on the lowland plains as alluvium by the main river systems. Kairanga soils are poorly drained and have a slow to very slow permeability. Used extensively for pastoral grazing and cropping. They are, however, susceptible to severe structural degradation under intensive continuous cropping, and as a result of pugging under stock treading, if not carefully managed.	Occurs on flat alluvial plain adjacent to the river levŪe.	Found on the alluvial plain adjacent to the levŪes deposited by the Rangitikei, Manawatu, Oroua and Otaki Rivers. Associated with the Manawatu (well-drained) soils.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Taranaki/M anawatu	Manawatu Silt Loam	NZ: Weathered Fluvial Recent Soil  USDA: Dystric Fluventic Eutrochrept	0 - 18 cm: Dark greyish brown silt loam, very fine and fine polyhedral structure.  18 - 30 cm: Olive brown silt loam; very fine polyhedral structure.  30 - 65 cm: Light olive brown silt loam; medium and fine blocky structure.  > 65 cm: Light olive brown silt loam grading to sandy loam at depth; few yellowish brown mottles; medium blocky structure.	The soil is formed from weakly weathered quartzo-feldspathic sediment washed down off the Ruahine and Tararua Ranges and deposited on the lowland plains as alluvium by the main river systems. Manawatu silt loams are well drained and have a moderate permeability throughout the profile. While they have a high versatility and are suited to most land uses, they have a high structural vulnerability and therefore need to be managed well to maintain their soil quality for economic and environmental sustainability.	Occurs on higher flat surfaces of the levÚe adjacent to the river systems meandering across the alluvial plain.	Found on the levees of the alluvial plain adjacent to the Rangitikei, Manawatu, Oroua and Otaki Rivers. Associated with the Kairanga (poorly drained) soils.	







Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Taranaki/M anawatu	Marton Silt Loam	NZ: Argillic-fragic Perch-gley Pallic Soil  USDA: Aeric Kandiaqualf	0 - 25 cm: Dark greyish brown to very dark greyish brown silt loam, fine polyhedral structure.  25 - 50 cm: Greyish brown to light olive brown silty clay; common reddish yellow and light olive grey mottles; few dark brown clay cutans; coarse blocky structure.  50 - 63 cm: Light brownish grey to light yellowish brown silt loam; many yellowish red and pale olive mottles; many dark brown clay cutans; medium blocky structure.  63 - 105 cm: Light brownish grey to light yellowish brown silty clay with many light olive grey and strong brown mottles; many dark brown clay cutans; extremely coarse prismatic structure with large grey vertical veins.	The soil is formed from moderately weathered quartzo-feldspathic loess and tephric loess blown from the aggrading beds of rivers. Kawakawa Tephra, a rhyolitic volcanic ash erupted from Lake Taupo about 22,600 yrs BP, occurs between 50-63 cm depth. Marton soils are poorly drained with a moderate permeability in the topsoil and slow permeability in the subsoil. Typically has large vertical grey veins between the prismatic, gammate structures. Used extensively for cropping (mainly barley, wheat and maize) and grassland farming. The soil has a high structural vulnerability and therefore needs to be managed carefully to maintain soil quality and productive potential.	Occurs on flat and rolling uplifted Tokomaru marine-cut terrace surfaces.	Found on the extensive flat to rolling terraces on the west coast of New Zealand between Palmerston North and Wanganui. Associated with Kiwitea silt loam (moderately well drained), Dannevirke silt loam (well drained), Westmere silt loam (well drained) and imperfectly drained Westmere mottled silt loam.	
Taranaki/M anawatu	Moutoa Humic Clay	NZ: Acidic Recent Gley Soil  USDA: Fluvaquentic Endoaquoll	0 - 35 cm: Very dark grey humic clay, fine polyhedral structure.  35 - 50 cm: Dark brown clay; dark brown mottles; medium blocky structure.  50 - 75 cm: Dark grey clay; dark brown mottles; coarse columnar structure.  75 - 90 cm: Very dark grey silty clay; medium blocky and polyhedral structure.  >90 cm: Dark grey silt loam; dark brown mottles; massive structure.	The soil is a deep, dark, strongly structured topsoil formed from fine-textured quartzo-feldspathic alluvium. It is very poorly drained, with a moderately rapid permeability in the topsoil and very slow permeability in the subsoil. Very suited to cropping, market gardening and grassland farming when drained. High watertables during wet winter months can, however, give rise to periodic waterlogging.	Occurs on flat low-lying backswamps and basin depressions of the alluvial floodplain.	Found on flat backswamps of alluvial floodplains. Associated with very poorly drained Opiki silty clays where flood waters have occurred frequently in the past, and poorly drained Kairanga silty clays.	



Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Taranaki/M anawatu	Ramiha Silt Loam	NZ: Acidic Allophanic Brown Soil  USDA: Andic Haplumbrept	<p>0 - 30 cm: Dark brown silt loam; very fine and fine polyhedral structure.</p> <p>30 - 65 cm: Yellowish brown silt loam; fine polyhedral structure.</p> <p>65 - 95 cm: Yellowish brown silt loam; fine and medium blocky structure.</p> <p>&gt;95 cm: Light yellowish brown silt loam; medium blocky structure; grading to weathered greywacke at depth.</p>	The soil is formed from quartzo-feldspathic loess, tephric loess and thin distal deposits of mainly andesitic tephra. A notable feature of the Ramiha soil is the very strongly developed topsoil structure and its very high aggregate stability. The soil is well drained with a rapid permeability in the topsoil and moderate permeability in the subsoil. Very suited to grassland farming and forestry.	Occurs on the rolling and hill slopes of hill and steep land country as Ramiha silt loam, rolling phase and Ramiha silt loam, hilly phase respectively.	Found on the rolling and hill slopes of the Tararua and Ruahine Ranges between 300 to 600 m elevation with a rainfall of 1300 to 1800 mm. Associated with well-drained Korokoro silt loam, hilly phase, well-drained Ruahine silt loam, steep phase, and well to somewhat excessively drained Makara silt loam, steep phase.	
Taupo	Kaingaroa Sand	NZ: Welded Impeded Pumice Soil  USDA: Typic Udivitrand	<p>0 - 7 cm: Very dark greyish brown sand with angular pumice lapilli.</p> <p>7 - 13 cm: Yellowish brown and dark brown sand with many angular pumice lapilli.</p> <p>13 - 26 cm: Light yellowish brown sand with many angular pumice lapilli.</p> <p>26 - 100 cm: Pale yellow gravelly sand with angular pumice lapilli and blocks from 1 to 6 cm diam., compact in situ.</p>	<p>The soil is formed from flow-tephra during the Taupo eruption. with a welded-compacted subsoil which has a massive soil stucture in situ breaking to single grain.. Vegetation was mostly tussock-low shrub before most of it was planted in plantation forest. Soils need to be ripped and mounded in preparation of planting with Pinus radiata.</p> <p>Properties: Low nutrient levels, especially phosphorus,magnesium,nitrogen and potassium. Shallow topsoils with low percent organic carbon. Low water-holding capacity.</p>		The soils occur chiefly on the Kaingaroa Plateau on flat to easy rolling topography. At lower elevation they are named Atiamuri soils and in southern Taupo where the flow-tephra is overlain by a thin layer of Ngauruhoe Tephra, they are named Moerangi soils.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Taupo	Oruanui Sand	NZ: Podzolic Orthic Pumice soil  USDA: Andic Haplorthod	0 - 19 cm: Black friable sand with few pumice lapilli.  19 - 27 cm: Dark reddish brown sand with many fine pumice lapilli.  27 - 38 cm: Brown to dark brown sand with many fine pumice lapilli.  38 - 65 cm: Dark yellowish brown sand.  65 - 73 cm: Pale olive coarse sand with abundant pumice lapilli on Pale yellow pumice gravel.	<p>The soil is formed from airfall Taupo Pumice (1850 10 years BP) under podocarp forest under 1400 to 1800 mm annual rainfall on rolling to hilly topography. The soil is well drained and suited to be used for beef and/or sheep farming,plantation forestry and pip fruit orchards.</p> <p>Properties: Strongly leached with low levels of P,K,N,MgK,Bo. Low bulk densities and high plant available water holding capacity. The soil has no physical root barriers and is resistant to compaction.Soil stucture is weakly developed.</p>		Extensive in northern Taupo. part of a climo sequence of Taupo-Oruanui-Tihoi soils. Similar soils in southern Taupo are Rangipo soils with thin Ngauruhoe Tephra at the surface and weathered andesitic tephra below Taupo Pumice.	
Taupo	Taupo Sand	NZ: Immature Orthic Pumice Soil  USDA: Typic Udivitrand	0 - 9 cm: Very dark brown friable gritty sand.  9 - 24 cm: Yellowish brown and olive yellow gravelly sand, friable with many pumice and rhyolitic lapilli and fragments.  24 - 34 cm: Pale brown gritty sand.  34 - 64 cm: Very dark grey and very pale brown pumice gravel.	<p>The soil is formed from Taupo Pumice (1850 10 years BP) under tussock-shrub vegetation and relatively low annual rainfall (10000 - 1400 mm). This resulted in thin topsoils and B horizons. The soil is somewhat excessively drained and summer droughts are common.</p> <p>The soil is suited to sheep and beef farming, lucerne cropping, and plantation forestry.</p> <p>Properties: Low bulk densities, no physical barriers to root penetration, moderate water-holding capacity, good resistance to compaction despiteweakly developed soil sructure. Low nutrient levels (low P,K,N,Mg, Bo)</p>		Generally in low rainfall areas such as Taupo township on easy rolling to hilly topography. Low rainfall member of a climo-sequence of Taupo - Oruanui - Tihoi soils.	







Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Taupo	Taupo Tephra	NZ: TBA  USDA: TBA					
Taupo	Tihoi Loamy Sand	NZ: Humose Orthic Podzol  USDA: Andic Haplorthod	<p>0 - 9 cm: Black to very dark greyish brown loamy sand.</p> <p>9 -19 cm: Greyish brown fine sand.</p> <p>19 - 38 cm: Dark reddish brown loamy sand.</p> <p>38 - 50 cm: Strong brown gritty sand on Yellowish brown pumice gravel with dark grey fragments of rhyolite.</p>	<p>The soil is formed from Taupo Pumice(1850 10 years BP) under rimu forest and over 1800 mm annual rainfall. It has a bleached (whitish-looking) horizon below the topsoil indicating very strong leaching.Used for sheep and beef farming and plantation forestry.</p> <p>Properties: Low levels of nutrients (P,K,Mg,N,Bo). Low bulk density, no root barriers, good water-holding capacity and resistance to compaction depite weakly developed soil structure.</p>		<p>In northern Taupo at elevations of 1800 to 2000 m a.s.l. on rolling to hilly country. Part of a climosequence of Taupo - Oruanui - Tihoi soils. Maroa soils where Taupo Pumice has eroded off and the soil is formed from weathered rhyolitic tephra.</p>	



Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Taupo	Waipahihi Sand	NZ: Immature Orthic Pumice Soil  USDA: Typic Udivitrand	0 - 12 cm: Very dark brown sand with many fine rounded pumice lapilli.  12 - 29 cm: Yellowish brown and dark yellowish brown gravelly sand with many strong brown pumice lapilli.  29 - 100 cm: Light yellowish brown and greyish brown pumiceous sand containing much dark grey rhyolite.	<p>The soil is formed from water-sorted Taupo Pumice that eroded off adjacent hilly slopes. Rounded pumice lapilli layers, often cross-bedded, occur throughout the profile. Summer droughts occur on this well to somewhat excessively drained soil.</p> <p>Properties: Very low nutrient levels of phosphate, magnesium, nitrogen. Also potassium and boron. There are no root barriers, low bulk densities and medium water-holding capacity. Soil structure is single grain.</p>		<p>The soil occurs in usually U-shaped valley floors throughout the pumice country. They are named Turangi soils in southern Taupo where the water-sorted pumice is overlain with thin Ngauruhoe Tephra</p>	
Waikato	Bruntwood silt loam	NZ: Typic Impeded Allophanic Soil  USDA: Aquic Hapludand	0 - 20 cm: Very dark greyish brown silt loam, fine polyhedra structure.  20 - 60cm: Brownish yellow silt loam, medium polyhedral structure.  60 - 80 cm: Light yellowish brown silt loam, yellowish brown mottles.  80 - 100+cm: Light grey loose sand or moderately firm silty clay.	<p>The soil is formed in layers of alluvium. The soil is moderately well drained and has a moderate permeability. Suited to intensive grassland, mixed cropping and horticultural production.</p>	Occurs on the edges of the raised flat to gently undulating land of the plain.	<p>Found on flat to undulating land at intermediate levels between higher and lower areas. Associated with Horotiu silt loam (better drained), Bruntwood silt loam imperfectly drained variant (imperfectly drained), and Te Kowhai silt loam (poorly drained).</p>	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Waikato	Bruntwood silt loam pale subsoil variant	NZ: Typic Gley Allophanic Soil  USDA: Aquic Hapludand	<p>0 - 20 cm: Dark brown silt loam, fine polyhedral structure.</p> <p>20 - 50cm: Brownish yellow silt loam, yellowish brown mottles, medium polyhedral structure.</p> <p>50 - 80 cm: Light grey silt loam, yellowish brown mottles, moderately weak strength.</p> <p>80 - 100+cm: Moderately weak sand or moderately firm silty clay loam.</p>	The soil is formed in layers of alluvium. The soil is imperfectly drained and has a moderate permeability. Suited to intensive grassland, mixed cropping and horticultural production.	Occurs on the edges of the raised flat to gently undulating land of the plain.	Not a very common soil and rarely occurs in large areas. Often associated with Te Kowhai soils where elevation has increased slightly resulting in improved drainage.	
Waikato	Hamilton clay loam	NZ: Typic Orthic Granular Soil  USDA: Typic Haplohumult	<p>0 - 18 cm: Very dark greyish brown clay loam, medium polyhedral structure.</p> <p>18 - 60cm: Dark yellowish brown clay, many mottles, clay coats, polyhedral structure.</p> <p>60 - 80 cm: Strong brown clay, many mottles, strongly developed polyhedral and block structure, clay coats.</p> <p>80 - 100+cm: Strong brown clay with light grey mottled layers, coarse polyhedral structure, abundant clay coats.</p>	The soil is formed in strongly weathered volcanic ash of the Hamilton Ash Formation. The soil is moderately well drained with moderately slow permeability. Suited to pastoral farming, cropping and forestry. Root mats can form at the boundary between ash layers.	Occurs on low rolling hills of the Hamilton and Hauraki regions.	Common on the rolling hills, particularly North of Cambridge and Hamilton City. Kainui silt loam can occur with Hamilton soils but have siltier topsoils and upper subsoils. There are various phases of the Hamilton soil types depending on slope.	







Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Waikato	Horotiu silt loam	NZ: Typic Orthic Allophanic Soil  USDA: Typic Udivitrand	0 - 20 cm: Dark brown silt loam, medium polyhedral structure.  20 - 60cm: Yellowish brown silt loam, medium polyhedral structure.  60 - 80 cm: Yellowish brown to brownish yellow sandy loam, very weak strength.  80 - 100+cm: Loose yellowish brown sand or gravelly sand.	The soil is formed in layers of alluvium. Sand or gravelly sand can occur below 60 cm from the surface. The soil is well drained with moderate permeability. Suited to pastoral farming, horticulture, cropping and forestry.	Occurs on the raised flat to gently undulating land of the plain.	Occurs on the higher undulations of the flat land and can form either narrow or broad areas of uniform soil. On the edges of the raised land are Bruntwood soils, and the surrounding lower areas are Te Kowhai soils (see adjacent figure). There are two other Horotiu soil types; Horotiu shallow silt loam (sand a gravels less than 60 cm from the surface), and Horotiu mottled silt loam.	
Waikato	Matangi silt loam	NZ: Typic Sandy Gley Soil  USDA: Aquantic Humaquept	0 - 25 cm: Black to very dark greyish brown silt loam, often humic.  25 - 40cm: Light greyish brown to dark greyish brown loamy silt to loamy sand.  40 - 60 cm: Very pale brown to yellowish brown fine to coarse loamy sand, reddish yellow to strong brown mottles..  60 - 100+cm: Light grey to light yellowish brown fine to coarse loamy sand, reddish yellow to strong brown mottles.	The soil is formed in layers of alluvium. Both humic and peaty topsoils are present, as the soil has formed adjacent to peat swamps. This soil appears to have has poor drainage, but it is not yet known whether this is still the case today.	Occurs in the flat to gently undulating land, forming in mounds and hollows of alluvial material.	Associated with the Te Kowhai silt loam, other soils that have formed on alluvial material in lower lying areas (e.g. Ngaroto soils), and the Te Rapa soils that have similar humic and peaty topsoils.	


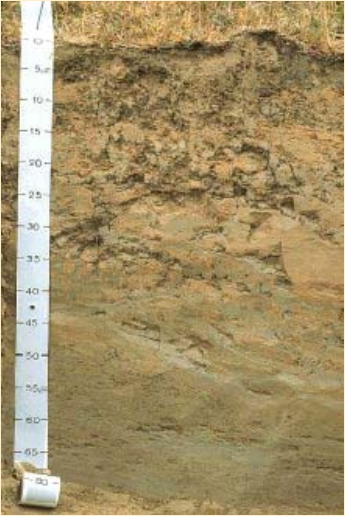
Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Waikato	Motumaoho Silty Peat	NZ: Acid Humic Organic Soil  USDA: Terric Medisaprist	0 - 25 cm: Black completely decomposed peat, fine polyhedral structure.  25 - 65 cm: Dark brown moderately decomposed peat.  65 - 80 cm: Yellowish brown silty clay.  80 - 100+cm: Light yellowish brown silty clay.	The soil is formed in layers of completely to moderately decomposed peat with minor additions of silty volcanic ash, on clayey alluvium. The soil is poorly drained but artificial drainage means that many are now moderately well drained. Maintenance of the drainage system is important to prevent flooding. Suited to pastoral farming, but not suitable for horticultural crops susceptible low pH (acid) or wet soil conditions.	Occurs on flat to gently undulating land on the margins of large peat swamps.	Widely distributed throughout the Waikato lowland on the perimeter of large peat swamps or in old stream channels. Associated with Te Kowhai peaty loams and Te Rapa soils which have a shallower thickness of peat (less than 40 cm thick). Soils formed in deeper peat (Kaipaki and Rukuhia soils) can occur nearby.	
Waikato	Rukuhia peat	NZ: Acid Fibric Organic Soil  USDA: Hemic Medifibrist	0 - 15 cm: Reddish black very weakly decomposed peat.  15 - 50 cm: Reddish black weakly decomposed peat.  50 - 100+ cm: Very dusky red weakly decomposed peat wth wood.	The soil is formed in layers of peat over 100 cm thick with minor additions of silty volcanic ash and can have buried wood. The soil is very poorly drained. Maintenance of the drainage system is important to prevent flooding. The soil also has low bearing strength and care must be taken not to overdrain the soil so as to preserve the peat resource. Suited to pastoral farming, but not suitable for horticultural crops susceptible to low pH (acid) or wet soil conditions.	Occurs on flat to gently undulating land of large peat swamps. The land surface of the swamp is usually domed and there can be peat shrinkage on the edges of deep drains.	Widely distributed throughout the Waikato lowland on the large peat swamps. Associated with Kaipaki soils on the swamp margins.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Waikato	Silverdale silt loam and clay loam	NZ: Mottled Orthic Brown Soil  USDA: Oxyaquic Kanhapludalf	<p>0 - 20 cm: Very dark greyish brown silt loam (or clay loam), fine polyhedral structure.</p> <p>20 - 60cm: Yellowish brown clay loam, few fine mottles, medium polyhedral structure.</p> <p>60 - 100+ cm: Loose yellowish brown gravelly sand.</p>	The soil is formed in clayey alluvium, with sands or gravel occurring below 60 cm from the surface. The soil is moderately well drained with moderately slow permeability. Can be confused with Horotiu soils but are more clayey and sticky, and have lower P-retention. Suited to pastoral farming, cropping and forestry.	Occurs on the raised flat to gently undulating land of the plain. Often in the same landscape position as the Horotiu soil.	Occurs on the higher undulations of the flat land and can form either narrow or broad areas of uniform soil. In the surrounding lower areas are Te Kowhai soils. Associated with Horotiu soils. There are two Silverdale variants, one with a pale subsoil, and another which is imperfectly drained.	
Waikato	Tamahere silt loam	NZ: Artifact Fill Anthropic Soil  USDA: Typic Udivitrاند	<p>0 - 18 cm: Black, slightly gravelly coarse loamy sand.</p> <p>18 - 33 cm: Dark brown, slightly gravelly coarse sand.</p> <p>33 - 46 cm: Yellowish brown, silt loam.</p> <p>46 - 49 cm: Dark reddish brown, silt loam with charcoal fragments.</p> <p>49 - 95 cm: Yellowish brown silt loam.</p> <p>95 - 100+ cm: Light brownish grey, slightly gravelly coarse sand.</p>	The soil is formed in layers of gravelly sand dug up from below the soil and spread by the early Maori over the surface of what was originally a Horotiu soil. The soils are well drained and often have layers of charcoal and buried topsoil. Suited to pastoral farming, horticulture and forestry.	Occurs on well drained flat to gently undulating land. Remnants of the gravel borrow pits are often nearby and these now resemble smooth-sided craters 10 to 20 metres diameter and 2 to 4 metres deep.	Distributed mainly along main rivers and streams occurring on river terraces and slightly higher land of the Plain. Associated with Horotiu soils.	







Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Waikato	Te Kowhai silt loam	NZ: Typic Orthic Gley  USDA: Typic Ochraqualf	0 - 20 cm: Dark greyish brown silt loam, fine polyhedral structure.  20 - 50 cm: Light grey silt loam, many yellowish brown mottles, medium prismatic structure.  50 - 80 cm: Light grey silt loam, firm, coarse polyhedral structure.  80 - 100+ cm: Light grey medium sand.	The soil is formed in layers of alluvium. The soil is poorly drained resulting from compact subsoil layers with slow permeability. Suited to pastoral farming, but not suitable for horticultural crops susceptible to wet soil conditions.	Occurs in the lower areas of flat to gently undulating land.	Widely distributed throughout the Waikato lowland. Associated with other Te Kowhai soils (e.g. Peaty loams, brown subsoils variants), also associated with Bruntwood and Horotiu soils (see figure with Horotiu soil), and Te Rapa soils.	
Waikato	Te Kowhai, brown subsoil variant	NZ: Typic Orthic Gley  USDA: Typic Ochraqualf	0 - 20 cm: Dark greyish brown silt loam, fine polyhedral structure.  20 - 50 cm: Light grey silt loam, many yellowish brown mottles, medium prismatic structure.  50 - 80 cm: Light grey silt loam, firm, coarse polyhedral structure.  80 - 100+ cm: Light grey medium sand.	The soil is formed in layers of alluvium. The soil is poorly drained resulting from compact subsoil layers with slow permeability. Suited to pastoral farming, but not suitable for horticultural crops susceptible to wet soil conditions.	Occurs in the lower areas of flat to gently undulating land.	Widely distributed throughout the Waikato lowland. Associated with other Te Kowhai soils (e.g. Peaty loams, brown subsoils variants), also associated with Bruntwood and Horotiu soils (see figure with Horotiu soil), and Te Rapa soils.	



Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Waikato	Te Rapa peaty or humic silt loam brown subsoil variant	NZ: Humose Orthic Podzol  USDA: Humic Haplorthod	<p>0 - 20 cm: Black peaty or humic silt loam, medium granular or polyhedral structure.</p> <p>20 - 40cm: Brown to dark brown silt loam, moderately weak soil strength.</p> <p>40 - 80 cm: Dark yellowish brown silt loam, moderately weak soil strength.</p> <p>80 - 100+ cm: Yellowish brown sand or gravelly sand.</p>	The soil is formed in layers of alluvium. The soil is well drained with a moderate permeability. Suited to pastoral farming, forestry, horticulture and cropping.	Occurs on low ridges or flat areas slightly higher than the surrounding land, commonly adjacent to peat swamps.	Te Rapa peaty and humic silt loams occur adjacent to the Te Rapa brown subsoil variant. The Te Rapa shallow brown subsoil variant is similar to the Te Rapa brown subsoil variant. The Te Rapa shallow brown subsoil variant has sand and gravels present less than 60 cm from the surface, which makes it a more excessively drained soil.	
Waikato	Te Rapa peaty or humic silt loam	NZ: Humose Groundwater - gley Podzol  USDA: Humic Aquic Haplorthod	<p>0 - 20 cm: Black to very dark greyish brown peaty or humic silt loam, medium polyhedral.</p> <p>20 - 35 cm: Dark brown to dark reddish brown silt loam, moderately weak soil strength.</p> <p>35 - 70 cm: Yellowish brown silt loam, medium polyhedral structure.</p> <p>70 - 100+ cm: Light grey sand to sandy loam.</p>	<p>The soil is formed in layers of alluvium, and has a characteristic topsoil of completely decomposed black peaty or humic silt loam.</p> <p>The soil is moderately well drained with moderate permeability. Suited to intensive grassland, mixed cropping and horticultural production.</p>	Occurs on low ridges or broad flat areas, commonly adjacent to peat swamps.	The Te Rapa brown subsoil variant occurs next to the Te Rapa silt loams, on slightly higher ground. The Te Rapa pale subsoil variant occurs adjacent to the Te Rapa silt loams, on lower ground.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Wellington/ Wairarapa	Kourarau Hill Soils	NZ: Typic Rendzic Melanic Soil  USDA: Lithic Rendoll	0 - 20 cm: Very dark brown clay, strongly pedal, fine polyhedral macrofabric.  20 - 50+ cm: white shelly limestone.	The soil is formed by weathering of the underlying limestone. There is a sharp boundary between the topsoil and the limestone.	Occurs on moderately steep hillsides, where limestone rock has not been covered by loess.	Located in hills to the east of the Wairarapa Valley, near Gladstone. Associated soils are Taihape hill soils formed in siltstone, and Rangitumau steepland soils on steeper adjoining slopes.	
Wellington/ Wairarapa	Taihape Steepland Soils - Eroded	NZ: Mottled Immature Pallic Soil  USDA: Aeric Epiaquept	0 - 4 cm: Brown silt loam.  4 - 23 cm: Yellowish brown clay loam with profuse light olive grey mottles, moderately pedal, coarse blocky macrofabric.  23 - 43 cm: Light yellowish brown weathered siltstone, with many light olive grey clay loam veins, weakly pedal, very coarse inclined lentiform macrofabric.  43 - 73 cm: Light yellowish brown weathered siltstone with common light olive grey clay loam veins.	The shallow soil is formed by soil slip erosion of the originally deep soil on compact weathered siltstone rock. The thin topsoil is developed immediately on the exposed lower subsoil of the former uneroded soil.. Soil water still perches on the slowly permeable siltstone layer, giving rise to grey colours and surface wetness. The soil is classed as imperfectly drained because of this, yet it also dries out completely for weeks during summer and autumn.	Found on moderately steep and steep hillsides.	Occurs extensively throughout eastern Wairarapa hill country. Closely associated with deeper uneroded version.	






Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Wellington/ Wairarapa	Taihape Steepland Soils Uneroded	NZ: Mottled Argillic Pallic Soil  USDA: Aquic Haplustalf	<p>0 - 17 cm: Very dark grey silt loam, moderately pedal, medium polyhedral macrofabric.</p> <p>17 - 30 cm: Light yellowish brown silt loam, weakly pedal.</p> <p>30 - 38 cm: Light brownish grey silt loam with yellowish brown mottles, moderately pedal.</p> <p>38 - 75 cm: Yellowish brown clay loam with strong brown and light brownish grey mottles, strongly pedal.</p> <p>(out of picture see eroded variant):</p>	The deep, uneroded soil is formed on compact weathered siltstone rock. The pale layer below the topsoil shows the results of worm activity. Soil water perches on the slowly permeable siltstone layer, giving rise to grey colours which extend through the clayey layer into the mottled silt loam. The soil is classed as imperfectly drained because of this, yet it dries out completely for weeks during summer and autumn.	Found on moderately steep and steep hillsides.	Occurs extensively throughout eastern Wairarapa hill country. Closely associated with shallower eroded versions.	
Wellington/ Wairarapa	Tauherenikau Shallow Silt Loam	NZ: Typic Orthic Brown Soil  USDA: Dystric Ustochrept	<p>0 - 18 cm: Very dark greyish brown silt loam.</p> <p>18 - 34 cm: Gravelly yellowish brown silt loam with some allophanic soil material.</p> <p>34 - 80+cm: Yellowish brown sandy gravel.</p>	Formed in ancient alluvial silt and gravel, and quite strongly weathered. Moderately permeable soil material over very permeable gravels. A somewhat excessively drained and droughty soil very suited to viticulture.	Occurs on alluvial plains and elevated river terraces.	Located on the Wairarapa Plains and around Martinborough. Associated with deeper, and well drained Tauherenikau silt loam, and imperfectly drained deep silty Martinborough loam.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Wellington/ Wairarapa	Wharekaka Silt Loam	NZ: Mottled Fragic Pallic Soil  USDA: Aeric Fragiaquept	<p>0 - 20 cm: Dark greyish brown silt loam.</p> <p>20 - 64 cm: Yellowish brown silt loam with profuse light brownish grey and strong brown mottles, coarse blocky macrofabric.</p> <p>64 - 110+cm: Yellowish brown silt loam with common light brownish grey veins, extremely coarse columnar macrofabric, hard fragipan.</p>	The soil is formed in post-glacial loess (wind deposited silt) and is old enough to have formed a compact layer (fragipan) in the lower subsoil. It is imperfectly drained, because the fragipan is slowly permeable, and water perches on it, causing the upper subsoil to become very wet and show grey and orange mottling.	Occurs on rolling loess-covered land.	Extends along the eastern side of the Wairarapa Plains, chiefly between Martinborough and Gladstone. Poorly drained version occurs in lower landscape positions. Wharekaka hill soils extend onto moderately steep slopes and are moderately well drained.	
Westcoast/ Southern Alps	Ahaura Stony Silt Loam	NZ: Acidic Mafic Brown Soil  USDA: Typic Haplorthod	<p>0 - 16 cm: Dark greyish brown slightly gravelly silt loam.</p> <p>16 - 30 cm: Yellowish brown moderately gravelly silt loam.</p> <p>30 - 46 cm: Yellowish brown very gravelly silt loam.</p> <p>46 - 94 cm: Dark yellowish brown extremely gravelly loamy sand.</p>	The soil is well drained and composed of abundant gravels, many of which are very coarse in size. The soil is formed from alluvial gravel and sand. Often used for sheep and cattle grazing.	Broad terraces formed from alluvial glacial deposits.	Occur in the Grey Valley.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Westcoast/ Southern Alps	Hochstetter Fine Sandy Loam	NZ: Acidic-mafic Allophanic Brown Soil  USDA: Typic Dystrochrept	0 - 15 cm: Dark red brown slightly gravelly fine sandy loam, fine polyhedral structure.  15 - 23 cm: Yellowish brown very slightly gravelly fine sandy loam, few humus coats.  23 - 45 cm: Yellowish brown very slightly gravelly fine sandy loam.  45 - 75 cm: Pale yellow slightly gravelly fine sandy loam.  75 - 100+ cm: Very gravelly coarse sand.	Formed on glacial moraine and so contains gravel of various sizes. The soil has high P retention which is a feature also found in Allophanic soils. The soil is mainly under native forest. The soil is freely-draining.	Occurs in the foothills of the Southern Alps.	Occur along the length of the Southern Alps, particularly on the western side.	
Westcoast/ Southern Alps	Kini Peat	NZ: Acid Humic Organic Soil  USDA: Typic Medisaprist	0 - 55 cm: Very fluid highly decomposed brownish black forest peat with abundant tree roots.  55 - 90 cm: Very fluid to moderately fluid dark brown silty peat with abundant tree roots.  90 - 190 cm: Dark greyish yellow moderately firm silt loam, massive.  190 - 200 cm+: Compact iron and organic-coated outwash gravels.	The soil is formed in forest peat over loess. The soil is extremely poorly drained, being saturated to the soil surface throughout the year. Naturally, the soil supports very dense stands of small rimu and silver pine forest but once cleared supports only swamp vegetation (sphagnum moss, rushes, ferns) and gorse. Areas of these soils have been utilised for commercial sphagnum moss production. The soil is so wet that the soil fauna include free swimming fish.	Surfaces of outwash terraces and in intermoraine hollows, but more common on older loess-mantled terraces.	This soil is found across Last- Glaciation-age landforms wherever drainage is impeded. Small pockets of these soils occur in moraine country at the wettest end of drainage sequences from moraine crests through to toeslopes or intermoraine hollows. They are associated with Kumara soils in these landscape positions. Larger areas of are found on outwash terraces. The soil is usually associated with Kumara soils on late Last Glaciation terraces and Okarito soils on older terraces.	



Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Westcoast/ Southern Alps	Kumara Soils	NZ: Silt-mantled Perch-gley Podzol  USDA: Typic Alaquod	0 - 10 cm: Reddish black greasy peat derived from forest litter.  10 - 34 cm: Brownish grey silt loam, weak polyhedral structure.  34 - 49 cm: Bluish grey silt loam, massive.  49 - 90 cm+: Brownish black humic gravelly sandy loam, compact.	The soil is formed in glacial outwash gravels. It is very poorly drained and of very low natural fertility. Under natural conditions it supports dense stands of rimu forest with a sparse hardwood subcanopy; many of these stands have been logged throughout Westland. When developed it is very difficult to maintain in pasture because of the poor drainage and low fertility. Land with these soils is often recontoured into a hump and hollow form to alleviate drainage problems.	Late Last Glaciation outwash terraces.	These soils are found on low terraces above present river floodplains. They are associated with extremely poorly drained Kini peats in swales and former channels on the terraces. On higher terraces occur soils with a similar appearance (Okarito soils) but they are formed in loess and the grey silty subsoil is much deeper.	
Westcoast/ Southern Alps	Moana Soils	NZ: Typic Perch- gley Podzol  USDA: Typic Epiaquod	0 - 20 cm: Very dark reddish brown forest litter.  20 - 25 cm: Greyish brown silt loam, fine polyhedral structure.  25 - 32 cm: Greenish grey silt loam, coarse polyhedral structure to massive.  32 - 51 cm: Yellowish brown gravelly silt loam, fine and medium polyhedral structure.  51 - 52 cm: Reddish brown weakly cemented iron pan with dark greyish brown organic stained silt loam above.	The soil is formed in glacial till. The soil is relatively well drained because of its landscape position although its permeability is moderate to low in the subsoil. Fertility is extremely low and it is difficult to maintain in a healthy pasture. Under natural conditions this soil supports mixed stands of large rimu and hardwoods.	Crest or shoulders of moraine ridges or hummocks.	This soil found on late Last Glaciation moraines which are not mantled by loess. It is associated with a number of other soils along drainage sequences from moraine crests to toeslopes or intermoraine hollows. These include well drained Hochstetter soils on steep sideslopes, Flagstaff soils on footslopes and gentle sideslopes, and Kini peats or Kumara soils in intermoraine hollows and toeslopes or terraces.	

Region	Name/ Soil Type	Classification (NZ and USDA)	Soil Description	Features	Landscape Position	Distribution and Associated Soils	Soil Picture
Westcoast/ Southern Alps	Okarito Silt Loam	NZ: Silt-mantled Perch-gley Podzol  USDA: Placic Haplaquod	<p>0 - 21 cm: Brown humic silt loam.</p> <p>21 - 54 cm: Light grey silt loam, firm, massive, many thin humus and clay coats.</p> <p>54 - 138 cm: Light olive grey silt loam, firm, massive, many yellowish brown mottles, humus and clay coats on cracks.</p> <p>138 + cm: Olive brown very gravelly coarse sand, loose.</p>	A poorly drained low fertility acid soil with a dense slowly permeable subsoil. Formed from loess over gravel. A very difficult soil to manage and drain.	Found on terraces of glacial alluvium. Often with a rimu or swamp vegetation.	Common on the West Coast, often in association with those with peaty of humic topsoils. Kumara Soils are similar but have formed from alluvium and have a thinner silty covering.	
Westcoast/ Southern Alps	Waita Loamy Sand	NZ: Typic Orthic Podzol Soil  USDA: Typic Haplorthod	<p>0 - 10 cm: Dark grey loamy sand.</p> <p>10 - 25 cm: Light grey sand.</p> <p>25 - 60 cm: Light yellowish brown sand, weak.</p> <p>60+ cm: Very pale brown sand, loose.</p>	The soil is formed on coastal sand dunes at Haast, is well drained and has very low natural fertility. Currently under native forest. There is a distinct E horizon.	Found on the crest of coastal dunes.	Occur on the West Coast near Haast.	