NSW GOVERNMENT Office of Environment & Heritage

Glossary of Terms used in Soil and Landscape Science

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Glossary of Terms used in Soil and Landscape Science

This is a compilation of terms used to describe various aspects of a soil landscape's landform, topography, geology, native vegetation, land use, land degradation, soils, qualities, limitations, hazards and recommendations for sustainable land use.

This document also includes rankings for laboratory test results used in Soil Landscape Series products.

A

A horizon	Surface mineral horizon(s) with some organic accumulation; either darker in colour than underlying horizons, or lighter in colour but with a lower silicate clay/sesquioxide content.
abrupt boundary	Soil layer boundary 5 – 20 mm wide.
Acid Peats	(Great Soil Groups classification) These soils show little horizon development, their main feature being the accumulation of a surface horizon of almost black, strongly acid, peaty organic matter which is maintained near saturation with water. The peat is generally well-decomposed and sticky but significant amounts of fibrous roots and partly decomposed plant remains occur near the surface. The lower part is commonly clayey or gravelly grading into the underlying mineral material.
acid rock	Igneous rocks with >10% free quartz e.g. rhyolite, granite.
acid soil	Any soil with pH of <6.5.
acid sulfate soils potential	Acid sulfate soils are clays, muds and sometimes sands associated with pyrite-rich marine sediments. They may also occur in association with some sulfidic ore bodies and sulfur-rich parent materials (e.g. some coals). These soils become extremely acid following exposure or drainage as sulfur compounds are oxidised and converted to sulfuric acid. This makes them corrosive to iron, steel, aluminium alloys and concrete. Underground services should be avoided or rustproofed. Actual acid sulfate soils are too acid for most plant species and are difficult to vegetate. Very acid drainage waters from these soils can profoundly disturb aquatic ecosystems. 1:25 000 acid sulfate soil risk maps and an accompanying report are available for all low lying coastal areas in NSW from the NSW Office of Environment and Heritage.
acid volcanics	Extrusive igneous rocks with a high percentage of silica-rich minerals e.g. rhyolite, andesite.
acidification hazard	(Soil Landscape terminology) Poorly buffered soils, especially those with expected buffering capacities of <30 kmol(+) ha/10 cm/pH unit

	show rapid increases in acidity. Soils can become more acid under land management systems that have net acid input, such as nitrogen leaching. Poorly buffered soils are usually sandy. In these soils, it is very important to maintain high levels of organic matter.
acidity	(Soil Landscape terminology) Extremely and strongly acid soils with laboratory measured pH (1:5 soil:water) values <5.5 often give rise to acid soil infertility. Associated problems include toxic levels of aluminium and/or manganese and deficiencies of most nutrients (especially calcium and molybdenum). While many native plants in eastern NSW have adapted to acid soil conditions, susceptible species may require heavy applications of lime or dolomite and often fertiliser to raise the pH (and nutrient supply) to a satisfactory level. Acid soils may corrode untreated underground metal installations.
actual acid sulfate soil	Acidic soil material resulting from the oxidation of iron sulfides. The soil material has a pH <4.0 (1:5 soil:water) when measured in dry season conditions and can be identified by one of the following: Yellow mottles and coatings of jarosite (straw yellow with a Hue of 2.5Y or more yellow and with a Chroma of 6 or more); underlying potential acid sulfate soils; or >0.05% water soluble sulfate. Can also be referred to as sulfuric materials. See also potential acid sulfate soils.
adamellite	Quartz monzonite; a granitic rock in which quartz comprises 10 – 50% of the felsic constituents and in which the alkali feldspar/total feldspar ratio is between 35 – 50%; the approximate intrusive equivalent of rhyodacite.
aeolian	A term applied to deposits of soil materials transported and/or arranged by wind.
Aeolian Soil Landscape	(Soil Landscape terminology) Soil landscapes that have accumulated by deposition of sand-sized particles by wind action. Aeolian soil landscapes include dune fields, dunes, blow-outs, sand sheets, lunettes and barrier ridges
agglomerate	Cemented mix of angular, fragmental volcanic material with fragments >20 mm in size.
aggradation, aggraded	The process of the building up of surfaces, such as streambeds or floodplains by the deposition of sediment and/or colluvium.
aggregate (soil)	A unit of soil structure consisting of primary soil particles held together by cohesive forces or by secondary soil materials such as iron oxides, silica or organic matter. Aggregates may be natural such as peds or formed by tillage such as crumbs and clods.
aggregation	Soils in which the primary particles are bound together into units known as aggregates. Forces contributing to aggregation include electrostatic forces on clay particles, cementing substances from organic matter or iron hydroxides, or plant roots and fungal hyphae.
AHD	Australian Height Datum, approximately mean sea level.

air-filled porosity, AFP	(Soil Landscape terminology) Air-filled porosity is the amount of soil occupied by air, which varies with moisture content. Most plants cease to grow when air porosity is <10%; air-filled porosity of ≥10% is usually considered to be suitable for most plants (Hazelton and Murphy 1992). Air-filled porosity is rated as per Wesseling (1974). • <1%— very low (VL) • 1 – 5%— low (L) • 5 – 20%— moderate (M) • 20 – 30%— high (H) • >30%— very high (VH).
alcove	Moderately inclined to very steep, short open depression with a concave cross-section, eroded by collapse, landslides, creep or surface wash.
alkaline soil	Alkaline soils have laboratory measured pH values >8.5. Alkalinity may inhibit the growth of plants.
alkalinity	(Soil Landscape terminology) Alkaline soils have laboratory measured pH (1:5 soil:water) values >8.5. Alkalinity may inhibit the growth of plants. High levels of carbonate or bicarbonate may impair the uptake of iron, manganese, copper and zinc. These soils are frequently sodic or saline.
allelopathy	The effect of chemical products of one plant (usually reducing growth, survival or reproduction) on another plant.
alluvial fan	Level to very gently inclined complex pattern of extremely low relief. The rapidly migrating alluvial stream channels are shallow to moderately deep, locally numerous, but elsewhere widely spaced. The channels form a centrifugal to divergent, integrated, reticulated to distributary pattern. Includes areas that are bar plains being aggraded or eroded by frequently active channelled streamflow, and other areas comprising terraces or stagnant alluvial plains with slopes that are greater than usual formed by channelled stream flow but now relict; incision in the upslope area may give rise to an erosional stream bed between scarps. Typical elements are streambed, bar and plain. Includes scarp. See also sheet-flood fan; pediment; stagnant alluvial fan.
alluvial plain	Large flat area of alluvium. Although it includes floodplains, the preferred use of the term is to describe former flood plains where there is no recent accumulation of sediment. See also stagnant alluvial plain.
Alluvial Soils	(Great Soil Group classification) Soils developed from recently deposited alluvium, normally characterise little or no modification of the deposited material by soil forming processes, particularly with respect to soil horizon development.
Alluvial Soil Landscape	(Soil Landscape terminology) Soil landscapes formed by deposition along rivers and streams. Soil parent material is usually deep, sorted and often stratified or previously stratified alluvium Alluvial soil landscapes include current floodplains and alluvial deposits. Typical landform elements include those found on meander plains including

	bars, back plains, scrolls, scroll plains, flood-outs, oxbows, levees, lower terraces, prior and current stream channels.
alluvial terrace	Former floodplain which either no longer floods or rarely floods due to deepening or enlargement of the stream channel.
alluvium/alluvial	A deposit of sand, mud or similar substances formed by flowing water.
Alpine Humus Soils	(Great Soil Group classification) Characterised by a marked accumulation of well-humified organic matter that is intimately incorporated into the mineral soil to form thick surface horizons of profiles otherwise showing little horizon development.
Aluminium toxicity potential	High levels of soluble aluminium are often toxic to non-native plants such as some pasture, crop and ornamental species. Toxicity can be expected when exchangeable aluminium levels are >5%, and soils are strongly acid. Many species of native plants tolerate soils with high concentrations of soluble aluminium. Lime or dolomite can be applied to raise soil pH and thus reduce exchangeable aluminium.
ameliorant	A substance used to improve the chemical or physical qualities of the soil. For example, the addition of lime to the soil to increase pH to the desired level for optimum plant growth or the addition of gypsum to improve soil structure.
amphibolite	Crystalloblastic rock consisting mainly of amphibole and plagioclase with little or no quartz.
amygdaloidal	Descriptive term for lavas (i.e. basalt) with cavities formed by the evolution of gas by the lava. The cavities are often subsequently filled by a mineral such as quartz.
anaerobic	Describes soil conditions in which free oxygen is deficient and chemically-reducing processes prevail. Such conditions are usually found in waterlogged or poorly drained soils in which water has replaced soil air.
anastomotic plain	A floodplain with slowly migrating deep stream channels, usually moderately spaced, forming a divergent to unidirectional integrated reticulated network. There is frequently active aggradation by overbank and channelled stream flow. Typical elements are stream channel, levee, back plain (dominant) See also alluvial plain; floodplain.
andalusite	An aluminium nesosilicate mineral (Al_2SiO_5) that forms under high pressure and/or temperature; its presence is indicative of higher grade metamorphism.
andesite	Dark coloured, fine-grained intermediate extrusive rock dominated by plagioclase, pyroxene and/or hornblende with lesser quantities of biotite, quartz, magnetite or sphene. The extrusive equivalent to diorite.
angular blocky	Soil particles are arranged around a point and bounded by six relatively flat, roughly equal faces with re-entrant angles between adjoining faces few or absent. There is usually considerable

	accommodation of ped faces to the faces of surrounding peds. Most vertices between adjoining faces are angular.
Anthroposols	(Australian Soil Classification) Soils resulting from human activities.
anticline	A fold in rock that is bowed upward with the oldest rocks at the centre of the fold.
apedal	In the moderately moist to moist state, none of the soil material occurs in the form of peds. It is massive or single-grained and, when disturbed, separates into fragments or primary particles.
aplite	A fine to medium-grained light-coloured igneous rock typically occurring as thin (<20 cm) veins within coarser-grained plutonic rocks.
aquiclude	A regolith or rock material which will not transmit water.
aquifer	A porous regolith or geological formation, often lying between impermeable subsurface strata, which holds water, through which water can percolate slowly over long distances and which yields groundwater to springs and wells. Aquifers may, however, be unconfined and the water level subject to seasonal inflow.
arboreal	Pertaining to trees.
arenite	The general term for any sedimentary rock with sand-sized grains.
argic horizon	A subsoil horizon consisting of distinct lamellae.
argillite	A low-grade metamorphic rock intermediate between mudstone and shale.
arkose	A sandstone, usually derived from a granitic rock, which usually contains ≥25% feldspars.
artesian basin	A structural basin of sedimentary rocks in the earth's crust which produces a constant supply of water. This rises to the ground surface by means of a natural artesian spring or via a man-made bore from a subterranean aquifer.
Associated Soil Landscape	(Soil Landscape terminology) Soil landscapes whose area on the map is of limited extent (usually <5 km^2). Often, associated soil landscapes occur on adjacent map sheets. Associated Soil Landscapes are briefly described in the appropriate section (by soil landscape grouping). Laboratory tests are not usually carried out on soil materials within associated soil landscapes.
Associated Soil Material	(Soil Landscape terminology) Associated soil materials, that are ephemeral or have limited extent, are briefly described. Soil tests are not usually undertaken on these materials.
Australian Soil Classification, ASC	Australia's national soil classification, a multi-category scheme with classes defined by diagnostic horizons or materials and their

	arrangement in vertical sequence as seen in an exposed soil profile; developed by the late Ray Isbell (CSIRO).
ash	Unconsolidated fine-grained material ejected during volcanic eruptions.
augite	$((Ca,Na)(Mg,Fe,Al)(Si,Al)_2O_6)$ The most common type of pyroxene.
available soil water	That part of the water in the soil that can be absorbed by plant roots, that can be held between field capacity and the moisture content at which plant growth ceases.
available water holding capacity	The ability to hold that part of the water in the soil that can be absorbed by plant roots. Available water is the difference between field capacity and permanent wilting point.

B

B horizon	Subsoil horizon(s) characterised by one or more of the following: concentration of silicate clay, iron, aluminium, and/or organic material; different structure and/or consistency to adjacent horizons; and/or stronger colours than adjacent horizons.
backplain	Large flat resulting from aggradation by overbank stream flow at some distance from the stream channel and, in some cases, having biological (peat) accumulations; often characterised by a high watertable and the presence of swamps or lakes; part of a covered plain.
backswamp	Almost level, closed or almost closed depression bounded in part by either hillslopes or dunes. Has a seasonal or permanent watertable at or above the surface.
bank (streambank)	Very short but laterally extensive slope, moderately inclined to precipitous, forming the margin of a stream channel and resulting from erosion or aggradation by channelled streamflow; part of a stream channel.
bar	Elongated, gently to moderately inclined low ridge built up by channelled stream flow; part of a streambed.
bar plain	A floodplain with numerous rapidly migrating, shallow, alluvial channels forming a unidirectional integrated reticulated network. Active aggradation and erosion by channelled stream flow are frequent. Typical elements are streambed, bar (dominant). See also alluvial plain; floodplain.
barrier beach	A narrow body of deposited sediment, extending along the coast, which is permanently exposed above sea level (Langford-Smith and Thom 1969).
barrier system	A compound formation comprising several beach ridges usually parallel to each other. A barrier system is developed by progradation of

	a coast and involves the seaward development of one beach ridge after another (Langford-Smith and Thom 1969).
basalt	A fine-grained, dark-coloured basic volcanic rock primarily composed of plagioclase and pyroxene (low silica and high ferromagnesian content).
basanite	Feldspathoidal olivine basalt.
base saturation	The percentage of total cation exchange capacity (CEC) saturated with basic ions.
batholith	Large body of intrusive igneous rock, often in the form of several distinct plutons.
batter	The excavated or constructed face of a dam wall, cutting or embankment.
bauxites	Aluminous duricrusts.
bauxitic horizon	A soil horizon containing >20% (visual abundance estimate) of bauxite nodules or concretions which are mostly uncemented. It has a thickness of >0.1 m.
beach	Short, low, laterally extensive slope, gently or moderately inclined, built up or eroded by waves, forming the shore of a lake or sea.
Beach Soil Landscape, Beach/Barrier Soil Landscape	(Soil Landscape terminology) Soil landscapes which have ground surfaces and soil parent materials that have been deposited by wave action, including accumulation of sand-sized coastal sediments during sea level changes. They typically occur near sandy coastlines or close to lake edges. Typical landform elements include bars, beaches, berms, beach ridges, dunes, swales, foredunes and some sandplains.
beach ridge	Elongated, nearly straight, low ridge built up by waves and usually modified by wind; often a relict feature remote from the beach.
beach ridge plain	Level to gently undulating with extremely low relief on which stream channels are absent or very rare. Consists of relict parallel beach ridges. Typical elements are beach ridge (co-dominant), swale (co-dominant). Includes beach, foredune, tidal creek. See also chenier plain.
bedrock	Solid rock underlying the soil profile or other surface materials. It does not necessarily represent the parent material of the overlying soil.
bench	Short, gently or very gently inclined minimal mid-slope or flat, eroded or aggraded by any agent.
bentonite	A clay usually formed by the weathering of volcanic ash and which is largely composed of montmorillonite type clay minerals. It has great capacity to absorb water and swell accordingly. For this reason, it is used to seal dams and/or earth embankments built of coarse materials or which contain a coarse-textured seam causing them to leak.

berm	A level area of loose sand between the upper limit of the swash zone and toe of the foredune, formed from marine deposition.
biotite	$(K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2)$ A brown/green mica, a layered silicate.
bioturbation	Movement of soil material within the soil profile by animals or plants.
Black Earth	(Great Soil Group classification) Black, heavy clay, alkaline to neutral soil with wide, deep cracks when dry.
bleach/bleaching	The near-white colouration of an A_2 horizon which has been subjected to chemical depletion because of soil-forming processes including eluviation. The colour is defined for all Hues as having a value of ≥7 with a chroma of ≤4, on dry soils. Conspicuous bleaching means that >80% of the horizon is bleached, whereas sporadic bleaching means that <80% of the horizon is bleached, with affected portions appearing irregularly through the horizon.
bleached loams	Soils with a uniform loam texture and a conspicuously bleached A_2 horizon.
bleached red earths	Red earths with a bleached A_2 horizon.
bleached yellow earths	Yellow earths with a bleached A_2 horizon.
block gliding	Displacement of blocks of sandstone gliding away from cliff faces.
blow-out	Usually small, open or closed depression excavated by wind.
bole	A fossil soil now interbedded between two basaltic lava flows. The presence of a bole indicates that tropical climates prevailed during its formation.
bolus	A small handful of soil which has been moistened and kneaded into a soil ball which just fails to stick to the fingers.
borrow area	An area or excavation from which soil, clay, sand, rock or gravel has been excavated for a specific purpose.
boundaries	The boundary between soil horizons defines the nature of the change from one horizon to the next below. It is specified by two terms: one is a measure of the width of the transition zone between the two horizons; the other is a description of its shape.
breccia	Rocks comprising sharp angular fragments in a fine-grained matrix.
Brown Clay	See Grey, Brown and Red Clays.
Brown Earth	(Great Soil Group classification) Uniform yellowish, reddish or brown, moderately acid to neutral light loams to clay with a crumb or fine subangular blocky structure, showing little profile differentiation.
Brown Hardpan Soil	See Red and Brown Hardpan Soils.

Brown Podzolic Soil	(Great Soil Group classification) Acid, mainly brownish to yellowish soils, lacking or with a weak A_2 horizon and generally have weakly to moderately differentiated profiles with merging horizons.
buffering capacity	The ability of the soil to resist changes in pH. The buffering action is mainly to the properties of clay and fine organic matter. Thus, with the same pH level, more lime is required to neutralise a clayey soil than a sandy soil or a soil rich in organic matter than one low in organic matter.
bulk density, estimated (BD PAWCER)	(Soil Landscape terminology) Bulk density is the dry weight of soil per unit volume. It affects air porosity and soil strength. The assessment of bulk density is based on a model to estimate plant available capacity called Plant Available Water Capacity Estimation Routine (PAWCER) from version 2.1 developed from Littleboy (1997). The algorithm for estimating bulk density requires 15 bar (pressure) moisture content, clay, silt, coarse sand, fine sand and lower depth. This method has been tested on soil data from Queensland and northern NSW. All soil materials submitted for soil analysis have PAWCER bulk density undertaken as routine laboratory testing procedure for all soils within the following texture ranges: 5 – 75% clay, 5 – 50% silt, 15 – 80% fine and coarse sand totals. Soil materials whose texture ranges fall outside these parameters are not calculated by PAWCER, and the Interp software provides default ranking of 1.4. The PAWCER program provides estimates based on the mineral components of the soil. Higher than expected estimates are likely to occur for soils higher in organic matter. Rankings for bulk density are based on Table 8.2 in Handreck and Black (1984), *Growing media for ornamental plants and turf*. The categories are: • Very open— Sandy soils with very low bulk densities have large pore spaces between soil aggregates. This makes it difficult for the plant roots to extract moisture and nutrients. These soils are highly permeable and have little capacity to retain moisture. • Satisfactory— Bulk density is normally satisfactory for plant growth and the medium is suitable for root growth with good pore space, good water infiltration and adequate water availability. • Very compact— Bulk density is high and soils are likely to be too compact for plant roots to penetrate easily. The small soil pores that are often present limit the availability of air to the roots; and water can be held tightly by the soil making it more difficult for plant roots to extract water and nutrients. • Extremely compact— Bulk density is extreme and soils are generally not suitable for plant growth without amelioration, such as improving soil structure with gypsum and organic matter, and reducing the movement of vehicles when soils are wet.
C	
C factor	(Soil Landscape terminology) The mulch or armouring effect of surface rocks can be roughly estimated from estimates of rock volume. The

	mulch effect may be considered as a minimum USLE cover factor when estimating sheet and rill erosion on soil devoid of vegetation. Estimated rock volume percentage ranges for multiplication factors have been averaged for field-recorded gravel factors from Table 603-5 of United States Department of Agriculture (1983). Minimum USLE cover factors do not equate with projected ground cover factors. These can be obtained from Wischmeier and Smith (1978).
C horizon	Layer(s) of consolidated or unconsolidated, generally partially weathered material showing lack of pedological development and/or presence of remnant geological structure or organisation e.g. sedimentary laminae, 'ghost' rock structures such as saprolite.
Cainozoic period	Geological period from 65 million years ago, to present.
calcareous	Calcareous materials, particularly soils, contain significant amounts of calcium carbonate. Describes rocks composed largely of, or cemented by, calcium carbonate. A calcareous soil is one containing carbonate in sufficient quantity to effervesce visibly when treated with cold dilute (N) hydrochloric acid.
Calcareous Red Earth	(Great Soil Group classification) Red, massive, sandy to loamy soils which are porous and 'earthy' in fabric with some free carbonates in the lower part of the profile.
Calcareous Sand	(Great Soil Group classification) Sands that show no profile development beyond some accumulation of organic matter in the surface horizon when they have been fixed by vegetation for sufficient time.
Calcarosol	(Australian Soil Classification Soil Order) Soils that are either calcareous throughout the solum or at least directly below the A_1 horizon.
calcrete	Calcareous duricrust; a conglomerate of sand and gravel cemented by calcium carbonate into a hard mass.
calcrete pan	A moderately, strongly or very strongly cemented layer of calcrete which is continuous, or if discontinuous or broken, consists of >90% of hard calcrete fragments.
caldera	Large basin-shaped depression, generally circular, around a volcanic vent; may be a product of erosion (erosion caldera) or of collapse following withdrawal or ejection of supporting lava below (collapse caldera).
carbic materials	Organic debris (e.g. charcoal) accumulated by colluvial and alluvial processes when torrential rain occurs following bushfires.
Carboniferous period	Geological period from 280 – 345 million years before present.
catena	A repetitive sequence of soils generally of similar age and parent material encountered between hill crests and the valley floor. The soils

	in the sequence occur under similar climatic conditions but have different characteristics due to variation in relief, drainage and the history of the land surface. Such variations normally manifest in differential transport of eroded material and the leaching, translocation and re-deposition of mobile chemical constituents. In soil mapping, the use of this term has been largely replaced by the more general term toposequence.
cation exchange capacity (CEC)	The total amount of exchangeable cations that a soil can absorb, expressed in centimoles of positive charge per kilogram of soil. Cations are positive ions such as calcium, magnesium, potassium, sodium, hydrogen, aluminium and manganese, these being the most important ones found in soils. Cation exchange is the process whereby these ions interchange between the soil solution and the clay or organic matter complexes in the soil. The process is very important as it has a major controlling effect on soil properties and behaviour, stability of soil structure, the nutrients available for plant growth, soil pH, and the soil's reaction to fertilisers and other ameliorants added to the soil.
channel	Linear, generally sinuous, open depression, in parts eroded, excavated and aggraded by channelled stream flow; may include stream bed, banks and bars.
channel bench	A flat at the margin of a stream channel aggraded and, in part, eroded by overbank and channelled stream flow; an incipient floodplain; is sometimes referred to as 'low terrace', but the term 'terrace' should be restricted to landform patterns above the influence of active streamflow.
chenier plain	Level to gently undulating landform pattern of extremely low relief on which stream channels are very rare. Consists of relict, parallel linear ridges built up by waves, separated by and built over flats (mudflats) aggraded by tides or overbank streamflow. Typical elements are beach ridge (co-dominant), flat (co-dominant). Includes tidal flat, swamp, beach, foredune, tidal creek. See also beach ridge plain.
Chernozem	(Great Soil Group classification) Like Black Earths, but of lower clay content and more friable, having porous structural units. The profile shows weak horizon differentiation with gradual boundaries. Soil reaction is neutral to alkaline. See also degraded chernozems.
chert	A hard, dense sedimentary rock of interlocking quartz crystals, often white or coloured; also called flint.
Chocolate Soil	(Great Soil Group classification) Brownish, acid, friable, moderately pedal to fine blocky structured, clay loam soils with weak to moderate horizon differentiation.
Chromosol	(Australian Soil Classification Soil Order) Soils with a clear or abrupt textural B horizon where the major half of the B_2 horizon is not strongly acid.
cirque	Precipitous to gently inclined and typically closed depression of concave cross-section and profile excavated by ice; the closed part of

	the depression may be shallow, the larger part being an open depression like an alcove.
clay	Fine-grained material with particles <0.002 mm diameter; composed normally of hydrated aluminium silicate minerals and plastic when moist. Forms a smooth plastic bolus; slight to firm resistance to shearing between thumb and forefinger; handles like plasticine; will form ribbon of 50–75 mm or more; approximate clay content 35 – 50% or more.
clay loam	Coherent plastic bolus; smooth to manipulate; will form ribbon of 40 – 50 mm; approximate is clay content 30 – 35%.
claypan	A pan consisting of a concentration of dense clays in the subsoil. The term is also used (colloquially) for the impermeable clay surface produced because of scalding.
claystone	A sedimentary rock composed primarily of clay-sized particles. It does not exhibit strong close-spaced planes of cleavage as slate does.
clear boundary	Boundary 20 – 50 mm wide.
cliff-footslope	Slope situated below a cliff, with its contours generally parallel to the line of the cliff eroded by sheetwash or water-aided mass movement and aggraded locally by collapsed material from above.
closed-grassland	Vegetation structure dominated by tussock, hummock or sod grasses having foliage cover <70%.
closed-sedgeland	Vegetation structure dominated by sedges with a canopy cover between 70 – 100% of the ground area.
coal	The metamorphic product of stratified plant remains.
coffee rock	A type of brownish sand rock or soil pan formed where iron oxides and organic matter, which have leached through the soil profile, are precipitated at or above a fluctuating watertable.
coherent	Two-thirds or more of the soil material, whether composed of peds or not, will remain united at the given moisture stage unless force is applied.
columnar	This ped shape is like prismatic but the peds are larger and their tops are domed. Like prismatic, but the peds are usually larger and have domed tops.
colluvial	Describes soil and rock material transported largely by gravity.
colluvial fills	Deep layer/s of materials transported by gravity and water down a slope which accumulate in drainage lines.
Colluvial Soil Landscape	(Soil Landscape terminology) Soil landscapes affected by mass movement. Soil parent material consists mostly of colluvial mass movement debris including scree and talus along with other landslide, mudflow and creep deposits. Colluvial soil landscapes usually include

	alcoves, cliffs, cliff-footslopes, scarps, landslides, talus, some moderately inclined to precipitous hillslopes, and areas with commonplace evidence of mass movement. Slope wash processes are considered less dominant.
colluvium	Heterogeneous rock and soil detritus transported by non-fluvial downslope processes, e.g., mass movement, sheetflow.
comendite	A glassy type of rhyolite.
competent	Ability of flowing water to transport large particles.
complex soils	(Soil Landscape terminology) Areas with two or more soil types that switch over relatively short horizontal distances and have different capabilities or require different management techniques. Management practices cannot be satisfactorily matched to any single soil type. It is often difficult to predict soil type distribution.
complex terrain	(Soil Landscape terminology) Areas where the nature of the land surface changes over relatively short distances, forming a mosaic of lands with different capabilities that are too small to manage individually. Examples include badlands, steeply dipping banded rock outcrops, intensively branched gullies and melonhole gilgai.
concavo-convex	A landform with a convex (waxing) upper slope and a concave (waning) lower slope.
concretions	Spheroidal mineral aggregates; crudely concentric internal fabric can be seen with naked eye; includes pisoliths and oliths.
cone	A hillock with a circular symmetry built up by volcanism; the crest may form a ring around a crater.
conglomerate	Detrital sedimentary rock substantially composed of rounded particles which are >2 mm diameter.
consistence	Consistence is a statement of the strength and nature of cohesion of a hand sample of soil material as it occurs in the field. Like field texture, it is determined by manipulation. It varies considerably by the moisture content of the sample, so it is important to also record a value for soil water status when testing.
contact metamorphism	Thermal metamorphism formed in country rocks adjacent to the contact with an igneous intrusion.
coral reef	Continuously active or relict landform pattern built up to sea level of the present day or of a former time by corals and other organisms. Mainly level, with moderately inclined to precipitous slopes below sea level. Stream channels are generally absent, but there may occasionally be fixed deep erosional tidal stream channels forming a disintegrated non-tributary pattern. Typical elements are reef flat, lagoon, cliff (submarine). Includes beach and beach ridge.

cordierite	($(Mg,Fe)_2Al_4Si_5O_{18}.nH_2O$) A hydrated cyclosilicate (ring silicate) commonly found in metamorphic rocks.
country rock	The rock bodies into which an intrusive mass of igneous rock intrudes.
coupe	A felling area within a logging operation.
covered plain	Floodplain with slowly migrating deep alluvial channels, usually widely spaced and forming a unidirectional integrated non-tributary network. There is frequently active aggradation by overbank streamflow. Typical elements are stream channel, levee, backplain (dominant). Includes swamp. See also alluvial plain; floodplain.
cowal	A swamp, small lake, small swampy depression or an old stream bed often associated with stagnant and alluvial plains.
crabhole gilgai	Irregularly distributed small depressions and mounds separated by a generally continuous shelf. The vertical interval is usually <0.3 m and the horizontal interval is usually 3 – 20 m. The surface is almost level.
crater	Steep to precipitous closed depression excavated by explosions due to volcanism, human action, or impact of an extra-terrestrial object
creep	Generally imperceptible but continuous movement of soil down a slope.
crest	Landform standing above all or almost all points in the adjacent terrain. It is characteristically smoothly convex upwards.
Cretaceous period	Period of geological time from 65 – 135 million years before present.
crevasse splay	Sediment fan deposited on a floodplain from a rupture in the levee of a river.
cropping land	Land normally cultivated for agricultural production such as grain and fodder production, rice and cotton but not for improved pasture or for vegetables, flowers or trees. Alternative term is dryland farming.
crumb	A soft, porous, generally rounded soil aggregate 1 – 5 mm in diameter.
cryptogams	Collective term which includes mosses, algae, lichen and liverworts.
cusp	A small, horn shaped beach feature formed in the swash zone.
cut face	Slope eroded by human activity.
cutans	Coatings on ped surfaces which may include clay skins or coatings of sesquioxide, manganese, ferromanganese, organic matter or carbonate.
cut-over surface	A flat eroded by human activity.

D

D horizon	Layer(s) showing contrast in pedological organisation to overlying A and/or B horizons, but not C horizon or buried soil.
dacite	An extrusive igneous rock of quartz plagioclase, hornblende and pyroxene. A fine-grained rhyolite, the extrusive equivalent of diorite.
dam	A ridge built up by human activity that closes a depression.
debris avalanche	A form of mass movement in which a combination of slumps, slides and rock falls occur as a large mass of material that falls down valley sides extremely rapidly under the influence of gravity.
debris dam	A small dam-shaped accumulation of debris on a slope which obstructs the natural flow of water.
deflation basin	A hollow formed in sand by the removal of loose material by the wind.
degraded Chernozems	Chernozems with topsoil of unstable, inferior structure.
delta	Floodplain projecting into a sea or lake, with slowly migrating, deep alluvial channels, usually moderately spaced, typically forming a divergent integrated distributary network. Aggraded by frequently active overbank and channelled stream flow that is modified by tides. Typical elements are stream channel, levee, backplain (co-dominant), swamp (co-dominant), lagoon (co-dominant). Includes beach ridge, swale and tidal creek. See also alluvial plain; floodplain; chenier plain.
Deltaic/Estuarine Soil Landscape	(Soil Landscape terminology) Occur where rivers and streams enter large bodies of water such as the sea or inland lakes. Channel flow is dissipated and is also modified by wave and/or (in the case of estuarine soil landscapes) tidal action. Soil materials may also be influenced by saline conditions in both cases. Typical landform elements within estuarine soil landscapes include estuaries, deltas, tidal creeks and flats, and parts of coastal lagoons. Typical landform elements within deltaic soil landscapes include stream channels, levees, back plains and some swamps and lagoons.
dense clays	Like Plastic Clays and Structured Clays (i.e. no suitable Great Soil Group classification) but with densely-packed peds.
densipan	Earthy pan of very fine sand (0.02 – 0.05 mm). Fragments, both wet and dry, slake in water. Densipans are less stable on exposure than overlying or underlying horizons.
depression	Landform element that stands below all, or almost all, points in the adjacent terrain. A closed depression stands below all such points; an open depression extends at the same elevation, or lower, beyond the locality where it is observed.

Dermosol	(Australian Soil Classification Soil Order) Soils other than those with B_2 horizons that have structure more developed than weak throughout the major part of the horizon.
Desert Loam	(Great Soil Groups classification) Soils which have moderate texture contrast with thin, loamy A horizons clearly separated from structural clay B horizons. brown to red colour, and alkaline reaction, commonly strongly so in the deeper subsoil. Surface soil pH ranges from alkaline to neutral.
Devonian period	Geological period from 395 – 345 million years ago.
diatomite, diatomaceous earth	A soft rock compound consisting of siliceous remains of diatoms.
diatreme	A small explosive volcanic intrusion comprising varying amounts and types of pyroclastic debris and surrounding country rock.
diffuse boundary	Soil layer boundary >100 mm wide.
dilatent	A diagnostic feature of soil materials with high silt content, this term refers to the ability of the soil to flow when wet due to its low wet-bearing strength.
dieback	(Soil Landscape terminology) Widespread death of branch tips and senescent trees that may indicate any of several soil, land use or landscape-related problems including salinity and rising water tables, ecosystem imbalances, high grazing pressures, drought or changes in soil fertility. Dieback may be addressed by establishing tree species suited to soil landscape conditions.
diorite	A medium-grained intermediate plutonic rock composed primarily of sodic plagioclase and hornblende, biotite or pyroxene.
dispersible soils	(Soil Landscape terminology) Often highly erodible and may have low wet-bearing strengths. Often very hardsetting when dry, and form surface crusts, restricting water entry and hampering seedling emergence. They are prone to erosion and structural degradation and require very careful management. They may be treated with lime or gypsum. Dispersible soils have a Dispersion Percentage (D%) >50%, or an Emerson Aggregate class of 1, 2 or 3, and may also have a sufficiently high sodium content to be considered sodic.
dispersion percentage, DP	(Soil Landscape terminology) A measure of soil dispersibility representing the proportion of clay and fine silt (approximately <0.005 mm) in a soil which is dispersible, expressed as a percentage. It is determined in the laboratory by comparing the amount of fine material, in a soil sample, dispersed by a ten-minute shaking in water, with the amount dispersed by a 120-minute shaking in water containing dispersant. Highly dispersible clays have a high dispersion percentage.
dispersion, dispersible	The characteristic of soils relating to their structural breakdown into individual particles in water. Usually associated with high levels of exchangeable sodium on the clay fraction and low levels of soluble

	salts in the soil. These factors cause clay particles to separate in water. As clay is one of the chief agents holding soil materials together, this leads to collapse of the soil structure and consequent instability.
Disturbed Soil Landscape	(Soil Landscape terminology) Soil landscapes dominated by ground surfaces arising from human activity. Soil parent materials have been moved, accumulated, removed or replaced (with soil or other items). Landform elements include fill-tops, embankments, cut faces, cut-over surfaces, dams, mounds and pits
dolerite	Intrusive igneous rock with lath-shaped plagioclase crystals included in pyroxene crystals; also called diabase.
dolomite	A sedimentary rock consisting of calcium magnesium carbonate ($CaMg(CO_3)_2$).
dominant peds	The most obvious peds in a disturbed soil sample. The relative difference between the strength of cohesion within peds and the strength of adhesion between peds is greater for dominant peds than for subdominant peds.
drainage	(Soil Landscape terminology) Drainage is affected by soil permeability, hydraulic gradient and the permeability of materials below the soil profile. Soils that drain water quickly are highly permeable. They usually have coarse textures (sands) and many interconnected pores. Soils with rapid drainage often have low waterholding capacities. Seedlings and newly established plants require regular, light irrigation. Drainage is assessed per McDonald *et al*. (1990). The categories are: • very poorly drained • poorly drained • imperfectly drained • moderately well-drained • well-drained • rapidly drained. For the 'Landscape qualities and limitations for each soil landscape' table (if included), poor drainage indicates very poorly or poorly drained soils. These soils are likely to pond water for long periods. They usually have clayey textures and mottled or greyish colours. Special drainage may be required. Rapidly draining soils often lack water storage capacity and may transmit pollutants rapidly to groundwater.
drainage depression	A level to gently inclined, long, narrow, shallow, open depression with smoothly concave cross-section, rising to moderately inclined sideslopes, eroded or aggraded by sheetwash.
drainage plain	A longitudinally-extensive, level or gently-inclined area of sediment, adjacent to a drainage line, built up by alluvial deposition during the current regime of the drainage line. Such areas are subject to periodic overland flow of water, may be subject to seasonal waterlogging and have vegetation types that often indicate a wetter microenvironment than the surrounding country.

Dry Peat Podzol	Dry peat soils underlaid by a bleached mineral layer.
Dry Peat	Soils in which the profile is dominated by dry organic matter (e.g., *Allocasuarina* needles).
dry sclerophyll	Canopy cover between 30 – 70% and with maximum height >10 m; dominated by sclerophyllous trees with a single lower stratum of xerophytic shrubs and herbs.
dune	Moderately inclined to very steep ridge or hillock built up by wind. Dune formation may be initiated by the entrapment of transported material by wind-reducing vegetation or structures. Series of parallel dunes are known as dune ridges. In the coastal environment, dune ridges develop during periods of sea level fall.
dunefield	Level to rolling with very low or extremely low relief without stream channels, built up or locally excavated, eroded or aggraded by wind. Typical elements are dune, swale and blow-out. Dunes are normally linear in form. However, when a blowout proceeds unchecked a U-shaped dune results. This is known as a parabolic dune.
Duplex soil	A soil in which there is a sharp change in soil texture between the A and B horizons (e.g., loam to clay). The soil profile is dominated by the mineral fraction with a texture contrast of 1½ texture groups or greater between the A and B horizons. Horizon boundaries are clear to sharp. The texture change from the bottom of the A horizon to the top of the B horizon occurs over a vertical distance of <10 cm (Northcote 1979). See also Gradational soil, Principal Profile Form, Uniform soil.
duricrust	The hardened crust of soil formed by accumulation through groundwater evaporation of iron, alumina, manganese, silica and other elements.
dyke	An intrusive, generally vertically-oriented sheet-like body of igneous rock that cuts across the bedding planes or structures of the surrounding country rocks.
dystrophic	Soil with effective cation exchange capacity (eCEC) divided by 100 g clay <5 mol(+)kg clay.
E	
earthflow	A category of mass movement involving earth materials flowing downslope like a viscous fluid. Displacement varies from extremely slow to extremely rapid.
earthy fabric	The soil material is cohesive and contains pores but few, if any, peds.
Earthy Sands	(Great Soil Groups classification) A mainly sandy soil with an earthy fabric and little texture differentiation from topsoil to subsoil

edaphic	Referring to soil factors affecting plant growth; an edaphic plant community is one distinguished by soil conditions rather than by other factors such as climate.
electrical conductivity (EC)	A measure of the conduction of electricity through water or a water extract of soil. It can be used to determine the soluble salts in the extract and hence soil salinity. The unit of electrical conductivity is the siemens and soil salinity is normally expressed as millisiemens per centimetre at 25^0 C. Conductivity values of 1.5 (1:5 soil:water) or 4.0 (saturation extract) indicate the likely occurrence of plant growth restrictions.
eluviation	The downward removal of soil material in suspension or in solution, from a layer or layers of a soil. The loss of material in solution is described by the term *leaching*. Some of the eluviated materials are typically deposited in lower layers or horizons.
embankment	Slope or ridge built up by human activity.
Emerson Aggregate Test (EAT)	(Soil Landscape terminology) A classification of soil aggregates based on their coherence in water. Small, dry aggregates are placed in dishes of distilled water and their behaviour is observed. The conditions under which they slake, swell and disperse allow the different aggregates to be separated into eight classes. The test is particularly valuable in a soil conservation context as it grades soil aggregates by their stability in water. Values are: **Class Result** 1 slakes complete dispersion 2 slakes some dispersion 3 slakes some dispersion after remoulding 4 slakes no dispersion, carbonate or gypsum present 5 slakes dispersion in shaken suspension 6 slakes flocculates in shaken suspension 7 no slaking swells in water 8 no slaking does not swell Charman and Murphy (2007) modifies classes 2 and 3 by dividing them into the following subclasses: **Subclass Dispersion** (1) slight milkiness immediately adjacent to the aggregate (2) obvious milkiness, less than 50% of the aggregate is affected (3) obvious milkiness, more than 50% of the aggregate is affected (4) total dispersion, leaving only sand grains. The sub-class is shown in brackets. For example, a Class 3 aggregate that disperses completely on working, leaving only sand grains, is recorded as Class 3(4).

engineering capability ratings	(Soil Landscape terminology) Engineering capability ratings rely mostly on USCS classifications. They serve only as a guide to what can be expected. Where dual (borderline) USCS classifications are given, the most dominant classification is used for the interpretation. Seek specialised engineering advice for specific recommendations.
engineering hazard	(Soil Landscape terminology) An assessment of the susceptibility of a parcel of land to the prevailing soil and landscape qualities present that will affect the stability of foundations for roads, buildings and related infrastructure. Inappropriately designed structures built on land with high engineering hazard can crack and become deformed, sometimes also damaging underground services. In some areas, entire buildings have been demolished, e.g. by mass movements. Geotechnical engineering advice should be sought before development on land identified as having moderate or high engineering hazard.
Eocene epoch	Geological epoch from 54 – 38 million years ago. It is the oldest division of Tertiary rocks.
erodibility	The susceptibility of a soil to the detachment and transportation of soil particles by erosive agents. It is a composite expression of those soil properties that affect the behaviour of the soil and is a function of the mechanical, chemical and physical characteristics of the soil. It is independent of the other factors influencing soil erosion such as topography, land use, rainfall intensity and plant cover, but may be changed by management. The qualitative categories of soil erodibility are low, moderate, high, very high and extreme. The most highly-erodible soils are those that are most easily detached and transported by erosive forces. High soil dispersibility is a good indicator of high soil erodibility.
erodibility	(Soil Landscape terminology) The susceptibility of a soil to the detachment and transportation of soil particles by erosive agents. It is a composite expression of those soil properties that affect the behaviour of the soil and is a function of the mechanical, chemical and physical characteristics of the soil. It is independent of the other factors influencing soil erosion such as topography, land use, rainfall intensity and plant cover, but may be changed by management. The most highly-erodible soils are those that are most easily detached and transported by erosive forces. High soil dispersibility is a good indicator of high soil erodibility. For sheet and rill erodibility, the USLE K factor (Wischmeier and Smith 1978) of >0.04 is highly erodible. In some cases, sheet and rill erodibility is modified by field assessment of factors such as existing indications of previous sheet erosion, fabric and consistency that are out of range or not accounted for by the USLE. Rankings for USLE K factors are: • very low (<0.01) • low (0.01 – 0.02) • moderate (0.02 – 0.04) • high (0.04 – 0.06) • very high (>0.06).

	These may be more broadly defined as: • low (<0.01 – 0.02) • moderate (0.02 – 0.04) • high (>0.04).
erodibility, wind	(Soil Landscape terminology) Wind erodibility is the susceptibility of a dry soil to detachment and transport by wind. It does not include other factors such as climate or surface roughness. Wind erodibility is assessed by measuring the percentage of air dry soil aggregates retained by a 0.85 mm hand sieve (Craze *et al*. 1993). A wind erodible soil will have a low percentage of retained aggregates. It is expected that sample handling and transport of samples before reaching the laboratory will decrease the proportion of retained aggregates. If the volume of rocks (or gravel, if no coarse fragment data are available) is <9.5%, then wind erodibility is very low (VL). For samples where wind erodibility test results are available, the assessment based on the US Soil Survey has been used (United States Department of Agriculture 1983).
erosion	The wearing away of the land by running water, rainfall, wind, ice or other geological agents including such processes as detachment, entrainment, suspension, transportation and mass movement.
erosion hazard	(Soil Landscape terminology) The susceptibility of a parcel of land to the prevailing agents of erosion. It is dependent on a combination of climate, landform, soil, land use and land management factors. The qualitative categories of erosion hazard are: • Slight— indicates no appreciable erosion damage may occur during development of a land use. Soil conservation management should include simple practices such as establishment of groundcover as rapidly as possible. • Moderate— implies significant erosion may occur during development of a land use. Provided appropriate soil conservation measures are adopted during development, both short-term and long-term erosion problems may be avoided. • High— implies significant erosion may occur. Intensive soil conservation measures are required to control erosion which will occur during development of a land use. Short-term measures are required in the initial stages of development, but long-term erosion control would involve intensive measures being implemented. • Very high— implies that significant erosion will occur both during and after development of a land use. Planning will need to carefully consider the balance between long-term erosion damage and the maintenance and repair needed to ensure the viability of the land use. • Extreme— implies that erosion will occur to such an extent that soil erosion control is impractical and uneconomic. These areas are best retained as green timber and not used. Where urban development proceeds despite this recommendation, detailed engineering, geotechnical and other studies will be necessary.

erosion hazard, water	(Soil Landscape terminology) Water erosion includes both sheet, rill and gully erosion. Soil landscape descriptions typically provide an assessment of erosion hazard for both non-concentrated flows (sheet erosion) and concentrated flows (rill and gully erosion) under relevant land uses. In these assessments, it is assumed that erosion hazard on land under cultivation or permanent pasture is long-term whereas erosion hazard in urban development is often confined to the construction phase, i.e., from time of initial disturbance until a good groundcover and appropriate stormwater drainage controls are established. See also gully erosion, rill erosion, sheet erosion.
erosion hazard, wind	(Soil Landscape terminology) Areas subject to wind erosion typically are exposed and have easily transported, unconsolidated, loose, sandy and often dry topsoils. Soil landscape descriptions typically provide an assessment of wind erosion hazard under relevant land uses. Vegetative cover should be maintained to prevent erosion.
Erosional Soil Landscape	(Soil Landscape terminology) Soil landscapes that have been sculpted primarily by the erosive action of running water. Streams are well-defined and capable of transporting their sediment load. Soils are usually shallow (with occasional deep patches) and mode of origin is variable and complex. Soils may be either absent, derived from water-washed parent materials or derived from *in situ* weathered bedrock. In many instances, subsoils have formed *in situ* while topsoils have formed from materials washed from further upslope. Erosional soil landscapes usually consist of steep to undulating hillslopes and may include tors, benches and areas of rock outcrop. Evidence of mass movement is rare.
escarpment	Steep to precipitous landform pattern, forming a linearly extensive, straight or sinuous, inclined surface which separates terrain at different altitudes. A plateau will commonly be found atop the escarpment. Relief may be high (hilly) or low (planar). The upper margin is often marked by an included cliff or scarp. Typical elements are hillcrest and hillslope. Includes cliff, scarp, talus, footslope and alcove.
estuarine	Pertaining to or formed in an estuary (brackish water). Relates to those soil materials which have been under the influence of brackish water during their deposition.
Estuarine Soil Landscape	See Deltaic/Estuarine Soil Landscape.
estuary	A stream channel close to its junction with a sea or lake where the action of channelled stream flow is modified by tides and waves. The width typically increases downstream.
Euchrozem	(Great Soil Groups classification) Red, strongly-structured clay soils with a somewhat lower clay content near the surface. They resemble Krasnozems but are more alkaline.
eutrophic	Base status >15 cmol(+)kg^{-1} clay.
exchangeable sodium percentage (ESP)	The proportion of the cation exchange capacity occupied by sodium ions, expressed as a percentage. Sodic soils are categorised as those

	with an ESP of 6 – 14%, strongly sodic soils are those with an ESP ≥15%. Soils with a high ESP are typically unstable and consequently have high erodibility and often present problems in soil conservation earthworks.
extratidal flat	Tidal flat characterised by infrequent tidal inundation and seasonally common freshwater inundation.

F

fabric	The appearance of the soil material using an ×10 hand lens. Differences in the presence or absence of peds, the lustre (or lack thereof), ped surfaces, and the size and arrangement of pores in the soil mass are noted. See also earthy fabric; sandy fabric; rough-ped fabric; smooth-ped fabric.
facet	A part of a soil landscape, distinguished by topography, lithology and/or soil type. Within individual soil landscape descriptions, facets may be labelled on cross-section diagrams, or their positions may be interpreted from type profile and topographic labelling. Facets are not depicted on soil landscape maps of this series.
facies	A body of rock with specified characteristics, ideally a distinctive rock that forms under certain conditions, reflecting a certain process or environment. See also green schist facies.
fan	Large, gently inclined to level element with a radial slope inclined away from a point, resulting from aggradation or occasionally from erosion by channelled, often braided streamflow, or possibly by sheet flow.
fault	A planar rock fracture showing evidence of relative movement.
faunal casts	Soil matter reworked by passing through the digestive tracts of soil animals.
feldspar/felspar	Aluminosilicates of potassium, sodium and calcium. Feldspar is characterised by two cleavages at nearly right angles and is among the most important constituents of igneous rock.
ferric horizon	One which contains >20% ferruginous nodules or concretions which are mostly uncemented. Its thickness is >0.1 m.
ferricrete	Indurated material rich in hydrated oxides of iron (usually goethite and hematite) occurring as cemented nodules and/or concentrations, or as massive sheets; may be referred to as laterite, duricrust or ironstone.
ferromanganese	Pertaining to red and black concretions or nodules consisting of iron (red) and manganese (black). These are often precipitated from groundwaters that have fluctuating watertables.
ferromanganiferous	Ironstone gravels containing oxides of manganese; may be localised within or scattered throughout the soil profile.

Ferrosol	(Australian Soil Classification Soil Order) Soils with B_2 horizons in which the major part has a free iron oxide content >5% iron (Fe) in the fine earth fraction (<2 mm). Soils with a B_2 horizon in which >0.3 m has vertic properties are excluded.
ferruginous cementation	The bonding of soil particles into a hard mass by the concentration of iron around a nucleus.
fertility	(Soil Landscape terminology) As a soil quality, 'fertility' is an assessment of the typical ability of a soil material to support plant growth. However, the fertility of a soil material can be influenced by many factors, and may vary for individual sites. Soil materials with poor fertility usually require the application of chemical fertilisers or suitable organic matter to support highly productive plant growth, although some soil materials do not respond well to normal applications of fertiliser. For example, soil materials with high aluminium or iron oxide contents readily immobilise phosphate, making it unavailable to plants. A soil material's physical condition can also reduce plant growth. The rankings used to describe the fertility of soil materials are: • Low— not generally, or only marginally, suitable for highly productive plant growth. It will have toxicity or extremely poor chemical fertility, and/or significant structural or water storage problems that will be expensive to overcome. • Moderate— moderately suitable for highly productive plant growth. It will have few chemical, structural and/or water storage problems. • High— well-suited for highly productive plant growth. It will have modest to good physical and chemical fertility with few or no structural or water storage problems. As a landscape quality, 'fertility' is an assessment of the typical ability of whole soil profiles to support plant growth. Properties of soil profiles that contribute to fertility include the level of nutrients, toxic elements, structural condition, the depth to which plant roots can penetrate, stoniness, drainage and the typical sequences and thicknesses of soil materials within the profile that may promote or restrict plant growth. This assessment of fertility is a guide only and does not constitute advice for any specific crop, pasture or horticultural use. Fertility is ranked as low, moderate, high or variable. The general concept of soil fertility may also be divided into three components: • Chemical fertility— refers to the supply of plant nutrients in the soil • Physical fertility— refers to soil structural conditions providing for aeration, water supply and root penetration • Biological fertility— refers to the population of micro-organisms in the soil and its activity in recycling organic matter.
fibric	Organic and fibrous; dark organic stain discolours fingers; greasy feel in clayey textures and coherence in sandy textures. Fibres (excluding living roots) or plant tissue remains are visible to the naked eye or easily visible with ×10 hand lens.

fibric (or fibrous) peat	Undecomposed or weakly decomposed organic material. Plant fibres (other than living roots) are distinct, readily identifiable and make up more than two-thirds of the material.
field capacity, FC	(Soil Landscape terminology) Field capacity is arbitrarily the amount of water remaining after a saturated soil material has drained against gravity. Field capacity is meaningful only for *in situ* soils that are relatively freely-draining. Field capacity is generally accepted to be equivalent to the water content of an undisturbed core soil sample that has been drained by 10 kPa suction in a pressure vessel. Field capacity for soil survey is measured on disturbed soil samples where some feld capacity-contributing pores may have been destroyed; hence it is considered to generally underestimate feld capacity for undisturbed soils. Field capacity results may, however, be considered approximate for disturbed soils. Gravimetric water content is converted to volumetric water content by multiplication by soil bulk density. If bulk density is not available, Interp assumes that bulk density is 1.4. Soils with high field capacity can hold more soil water against drainage by gravity than soil with low field capacity. All other things being equal, soil materials in well-drained profiles with low field capacities are more likely to dry faster than soil materials with higher feld capacities. High field capacities tend to be more important where rainfall is low, erratic or seasonal.
fill	Man-made deposits of rock, soil, tailings, etc.
fill-top	A flat aggraded by human activity.
fissile	A descriptive term for fine-grained sedimentary rocks that can split easily along bedding plains.
floc condition	Refers to the general flocculent or aggregated appearance of the soil mass especially when viewed under a ×10 hand lens.
flood hazard	(Soil Landscape terminology) Areas subject to periodic flooding by stormwater run-off and overland flow by rivers and streams should be retained as drainage reserves. Flood hazard is assessed from geomorphic context and the presence of unconsolidated flood deposits
floodout	A flat inclined radially away from a point on the margin or at the end of a stream channel, aggraded by overbank stream flow or by channelled stream flow associated with channels developed within the overbank flow; part of a covered plain.
floodplain	An alluvial plain characterised by frequently active erosion and aggradation by channelled or overbank stream flow. Includes other patterns: bar plain, meander plain, covered plain, anastomotic plain and delta. See also alluvial plain.
flowline	A well-defined route down which water naturally concentrates and flows. It is a general term including drainage depression, gully, drainage line, creek and river.

fluffy	Term used to describe soil (e.g. some Krasnozem topsoils) that is very light and finely-structured.
fluted	Pattern of steep, closely-spaced ridges that occurs on basalts, generally in those areas with <1,400 mm annual rainfall.
Fluvial Soil Landscape	See Alluvial Soil Landscape.
fold belt	An area of bending of the earth's crust due to compressional force.
folding	Buckling or warping of rock due to compressional force.
footslope	A moderate to gently sloping landform at the lower end of a slope, resulting from aggradation or erosion by sheetflow, earthflow or creep.
foredune	Elongated, nearly straight, moderately inclined to very steep ridge, built up by the wind from material from an adjacent beach.
forest land grazing	The grazing of stock in uncleared forest areas ranging from woodland (savannah woodland) to tall open forest (wet sclerophyll forest).
foundation hazard	(Soil Landscape terminology) The susceptibility of a parcel of land to prevailing soil and landscape limitations that will affect the foundation stability of roads, buildings and related infrastructure. It is primarily determined by soil movement, which in turn is related to the soil's physical properties, soil moisture regime and weight loadings. Soil chemical properties such as extreme acidity and salinity can also affect foundations through corrosion of concrete and services. Inappropriately designed buildings, structures and services built on or in land with high foundation hazard may experience cracks and deformations, whilst in some areas whole houses have been demolished through mass movement. These conditions are expensive to overcome but can often be avoided through appropriate planning and design. When moderate to high foundation hazards occur, you should seek advice from a professional geotechnical engineer. Further investigation to identify and locate the whereabouts of these significant hazards to foundation stability is required. In soil landscape reports, foundation hazard refers to foundations placed on or within *in situ* soil materials. It does not refer to structures placed on fill or into bedrock or for large structures which require detailed site investigation.
foundation stability rating	(Soil Landscape terminology) This assessment is based solely on soil properties after Finlayson (1982). Final assessment should be modified by many site conditions including drainage, geology, slope, climate and soil depth. Building foundation stability is assessed for small structures such as sheds and houses built on 300 mm wide footings. Larger structures would require generally deeper sampling depths. If volume expansion is >21% or linear shrinkage is >13%, then the very low (VL2) ranking applies. These soils normally require special foundations depending on seasonal variations in soil moisture.

frets	The wearing away or weathering of batter surface particles.
friable	Easily crumbled or cultivated.
fungal mat	Layer of soil material held together by fungal hyphae.

G

gabbro	A group of dark coloured, basic intrusive igneous rocks; the approximate intrusive equivalent of basalt.
genus	A classification group composed of closely-related species.
geological time	Units of time in descending order of magnitude, i.e. era, period and epoch.
geomorphic time	Scale of time, usually tens to hundreds of thousands of years, over which geomorphic features are formed.
geomorphology	Relates to the form of the earth, the general configuration of its surface, and the changes that take place in the evolution of landforms.
geotechnical report	Report on the engineering properties of the soil and terrain.
gilgai	Surface micro-relief associated with some clayey soils consisting of hummocks and/or hollows of varying size, shape and frequency. This phenomenon is a continuing long-term process due to the shrinking and swelling of deep subsoils with changes in moisture content. It is usually associated with the occurrence of expansive soils. See also crabhole gilgai; lattice gilgai; linear gilgai; melonhole gilgai; normal gilgai.
Gilgai Soil Landscape	(Soil Landscape terminology) Soil landscapes where seasonal shrink-swell is the dominant soil process. They are characterised by undulating microrelief, with small depressions, holes, shelves and mounds. Drainage is typically disintegrated. Gilgai types include crabhole, normal, linear, lattice, melonhole and contour.
gley, gleying	The grey or greenish-grey colouration found in soils. Gley is often produced under conditions of poor drainage giving rise to chemical reduction of iron and other elements. Any colour on the Munsell ‘gley’ charts.
Gleyed Podzolic Soil	(Great Soil Groups classification) Poorly-drained, acid soils with strongly-differentiated profiles, including a bleached A_2 overlying greyish or yellowish B horizons.
Gneiss	Coarse-grained banded crystalline rock formed during high-grade regional metamorphism; most have a granitic composition with minerals separating into schistose bands of micas and amphiboles and granulose bands of quartz and feldspar.

Gossan	A ferruginous deposit consisting principally of hydrated oxide of iron which is the result of oxidation and removal of sulfur and copper. The presence of pyrite is common.
Gradational soil	A soil in which there is a gradual change in soil texture between the A and B horizons, e.g., loam over clay loam over clay (Northcote 1966). See also Duplex soil, Principal Profile Form, Uniform soil.
gradual boundary	Boundary 50 – 100 mm wide.
Granite	Coarse-acidic plutonic igneous rock.
granitic	Pertaining to granite or granite-like rocks such as granodiorite and adamellite.
granitoid	A general term describing intrusive or plutonic igneous rocks in which the crystals are irregular, interlocking and of uniform size.
granodiorite	Coarse-intermediate intrusive igneous rock; the intrusive equivalent of rhyodacite; contains quartz, oligoclase or andesine, potassium feldspar and mafic minerals.
granophyre	Microgranite which displays granophyric texture i.e. intricate quartz-feldspar intergrowths that may resemble ancient cuneiform lettering and are referred to as 'micrographic'.
granular	Spheroidal or polyhedral peds having planar or curved surfaces which have slight or no accommodation to faces of surrounding peds. Peds are relatively non-porous.
grassland	Grasses, single stratum of grasses and forbs.
gravel	The amount (i.e., visual abundance estimate) of gravel-sized (>2 mm) materials that occur on the surface and in the A_1 horizon and, when moist, include hard coarse fragments and segregations of pedogenic origin.
gravelly	>60% of surface cover consists of gravel (2 – 60 mm).
Great Soil Groups Classification of Australia, GSG	Defined by Stace *et al.* (1968), the 43 (originally 47) Great Soil Groups describe soil types in terms of morphology, genesis and land use.
green schist facies	Metamorphic facies, also applied to altered mafic volcanic rocks, with a typical green colour due to abundant chlorite, actinolite and epidote, and exhibiting schistocity, foliation and/or layering. It includes the common products of low-grade regional metamorphism and is believed to correspond to temperatures between 300 – 500° C.
Grey, Brown and Red Clay	(Great Soil Groups classification) These form a broad group of soils whose common properties are determined by their high clay contents. Typically, they are moderately deep to very deep soils with uniform colour and texture profiles, weak horizonation mostly related to

	structure differentiation and some carbonates and/or gypsum in their subsoils. They crack deeply on drying.
greybilly	Rock found in sub-basaltic exposed sites and consisting of deposited secondary silica.
Grey-brown and Red Calcareous Soil	(Great Soil Groups classification) Shallow, soft, powdery or weakly structured loams to light clays containing finely divided carbonates throughout the solum and showing little pedological differentiation. They are essentially sedentary soils formed from highly calcareous rocks which underlie them at various depths. Fragments of limestone are commonly present.
Grey-brown Podzolic Soil	(Great Soil Groups classification) Duplex soil with a clayey brownish blocky B horizon. A bleached A_2 horizon might be present.
greywacke	Dark grey, firmly indurated sandstone with poorly-sorted quartz and feldspar with dark rock and mineral fragments in a clayey matrix. Sandstone with >15% clay minerals.
groundwater pollution hazard	(Soil Landscape terminology) Areas with high water tables and soils that are highly permeable with a low ability to retain nutrients are prone to groundwater pollution. Pollutants such as nutrients, pesticides, herbicides, detergents, sewerage seepage and other chemicals may leach through these soils, causing contamination of the groundwater.
GSG	See Great Soil Groups Classification of Australia.
gully	An open depression with short, precipitous walls and moderately inclined to very gently inclined floor or small stream channel, eroded by channelled stream flow and consequent gravitational fall and water-aided movement.
gully erosion	A complex of processes in which the removal of soil is characterised by large incised channels in the landscape >0.3 m deep. The severity of gully erosion may be recorded as minor, moderate, severe or very severe. Minor and moderate gully erosion is related to the density of gullies within the primary drainage lines over a specified area. With minor gully erosion, gullies are generally discontinuous, and with moderate gully erosion, they are generally continuous. When branching of the gullies away from the primary drainage line occurs, the severe categories are used. Three categories of gully depth may also be recorded: <1.5 m, 1.5 – 3 m and >3 m.
gully erosion risk	(Soil Landscape terminology) Areas with erodible and/or sodic or dispersible soils, high run-on, highly intensive rainfall, and locations where ground cover or surface soils have been disturbed or removed are vulnerable to tunnelling and gully erosion. Methods to combat gully erosion include engineered gully control structures (such as headwalls, sediment traps and weirs) replanting affected areas with ground cover species, and fencing off gullied areas to exclude stock.

gypsic horizon	A horizon containing >20% visible gypsum that is apparently of pedogenic origin and has a thickness ≥0.2 m.
gypsum	A naturally-occurring soft crystalline material which is the hydrated form of calcium sulfate ($CASO_4 2H_2O$). Deposits occur mainly in arid inland areas of Australia. Contains ~23% calcium and ~18% sulfur.

H

hand auger	Hand-turned drilling device in which cuttings are continually removed from the bottom of the bore. Also known as a post-hole digger.
hanging valley	An enclosed valley upstream of a nickpoint in the drainage line. Also, where a tributary valley's floor is at a higher level than the main valley due to deepening of the latter by glacial erosion.
hard	The general term to indicate strength or soil or rock material.
hard rock	General term for geological units consisting of unweathered rock as opposed to sediments such as river alluvium, sands or gravels.
hardsetting	Condition of a dry surface soil when a compact, hard and apparently apedal structure forms. In cultivated soils, clods usually retain this condition until completely broken down by repeated cultivation. Soils which do not set hard are either pedal both when moist or dry, or are apedal single-grained.
hardsetting soils	(Soil Landscape terminology) Soils that become hard, massive and compact when dry. They do not easily absorb rainwater and they cause high run-off with consequent soil erosion. They do not offer favourable environments for seed germination and require careful water management. Regular cultivation should be avoided, although some cultivation may be necessary to break up the hard layer for successful germination.
hardwood plantation	Land where the vegetation has been cleared and replaced with a plantation of native hardwood species e.g. *Eucalyptus* spp.
heath	Vegetation community consisting of a typically dense (canopy cover <30%) low (maximum height <2 m) upper stratum of shrubs with a sporadic lower stratum of forbs.
hemic peat	Moderately to well-decomposed organic material. Plant remains vary from most being difficult to identify to being unidentifiable. It is intermediate in degree of decomposition between the less decomposed fibric peat and the more decomposed sapric peat.
high-level subvolcanic intrusion	Intrusions of fine-grained diorite, granodiorite or granite composition. These intrusions might be circular or elliptical in outcrop with a diameter 1 – 4 km (Thorpe & Brown 1985).

hillcrest	Very gently inclined to steep smoothly convex crest, standing above a hillslope, eroded mainly by creep and sheetwash (overland flow).
hills	Landform pattern of high relief (90 – 300 m) with gently inclined to precipitous slopes. Fixed, shallow erosional stream channels, closely to very widely spaced, form a non-directional or convergent, integrated tributary network. There is continuously active erosion by wash and creep and occasionally active erosion by landslides. Typical elements are hillcrest, hillslope (dominant), drainage depression, streambed. Includes footslope, alcove, valley flat, gully, tor, summit surface, scarp, landslide talus, bench, doline. See also low hills; mountains; plain; rises.
hillslope	Gently inclined to precipitous slope, commonly simple and maximal and eroded by sheetwash, creep or water-aided mass movement; typical element of mountains, hills, low hills and rises.
hobby farm	Type of land development, irrespective of allotment size but usually relatively small, involving some form of agricultural enterprise which is secondary to the owner's main line of business.
Holocene epoch	Present geological epoch which commenced 10,000 years ago.
horizon	A layer within the soil profile with morphological characteristics and properties different from layers below and/or above the layer.
hornblende	$((Ca,Na)_{2-3}(Mg,Fe,Al)_5Si_6(Si,Al)_2O_{22}(OH)_2)$ Ferromagnesian mineral of the amphibole group.
horst	An uplifted, fault-defined block of the earth's crust.
horticultural land	Land used for production of fruits, vegetables, flowers or ornamental plants.
horticulture	The science and art of growing fruits, vegetables, flowers or ornamental plants.
humic	Referring to the organic matter within a soil.
humic cementation	The bonding of soil particles into a hard, brittle consistency by organic substances within a soil.
Humic Gley	(Great Soil Groups classification) Soils that are acid to neutral, mainly mineral soils with significant but widely varying organic matter contents intimately incorporated in the dark A horizons. They grade into subsoils marked by rusty and ochreous streaks and mottles on a pale grey matrix. Below this mottled horizon, the soil is typically grey to bluish-grey and permanently waterlogged, but the watertable fluctuates, periodically rising almost to the surface.
hummock	A small, raised feature above the general ground surface.
humose horizon	This is a humus-rich surface or near-surface horizon that is ≥0.2 m thick and has insufficient organic carbon to qualify as organic material.

Humus Podzol	(Great Soil Groups classification) These soils have a dark A_1 horizon of organic accumulation, a light grey or whitish A_2 horizon and a dark grey to black, dominantly humic B horizon overlying water-saturated and weakly mottled mineral soil.
Hydrophobic soils	Soils which resist wetting when dry. Drops of water do not spread spontaneously over their surface and into pores. The degree of water repellence may be severe where water drops remain on a flattened surface for some minutes. In other cases, drops appear to be absorbed readily but quantitative measurements show that the height of capillary rise is diminished. This characteristic is mainly a feature of some sandy soils (topsoils) and is generally attributed to organic coatings on the sand grains which resist water entry into the soil.
Hydrosol	(Australian Soil Classification) Soils that are saturated for >2 – 3 months in most years.

I

Included Soil Landscape	(Soil Landscape terminology) Small areas of other soil landscapes that occur within another soil landscape but are too small to show at the scale of mapping.
igneous	Rocks which have solidified from molten magma at or below the earth's surface; grains are characteristically crystalline and interlocking; crystal size decreases with increasing rate of cooling of the molten rock material.
ignimbrite	Rock formed by the consolidation of pyroclastic material deposited by ash flows.
illuviation	The process of deposition of soil material in the lower horizons of a soil due to its removal from upper horizons through eluviation. Materials deposited might include clay, organic matter, and iron and aluminium oxides.
impermeable	Not permeable to water. See also permeability.
improved pasture	Cleared or lightly-wooded land with a ground cover of grasses and/or legumes which are generally exotic species. Their grazing productivity has been raised by cultivation and/or use of fertilisers.
in situ	A Latin term meaning ‘in place’. Normally applied to rocks, fossils and soils which are situated where they were originally formed or deposited. When used to describe soils, it usually refers to those formed directly from or on bedrock.
incipient dune	The area at the rear of a beach where windborne sand accumulates through colonisation by perennial and annual plants, eventually to form a foredune.

industrial land	Land supporting factories, warehouses, sawmills, refineries and their environs or grounds used for the manufacture of products or goods.
infiltration	The downward movement of water into the soil. It is largely governed by the structural condition of the soil, the nature of the soil surface including presence of vegetation and the antecedent moisture content of the soil.
inner barrier	Barrier characterised by subdued topography and well-developed soils (Podzols). Considered to be Pleistocene in age and formed when sea levels were higher.
inset terrace	An abandoned floodplain (i.e., terrace) that has a new floodplain inset below it due to a fall in discharge. There is no downcutting into the bedrock valley floor and both terrace and floodplain share the same bedrock trench.
interbarrier swamp	Swamp or poorly-drained area that forms in the depression between the inner and outer barriers. The swamp is longditudinal and parallel to the coast. In many cases, a stream (i.e., interbarrier creek) is present instead of a swamp.
interfluve	The area of land between two adjacent flowlines.
intergrade	Soils types showing traits of (usually) two Great Soil Groups.
intertidal flat	Large flat subject to frequent inundation by water that is usually salty or brackish, aggraded by tides.
intrusion	A body of igneous rock which has been forced into older surrounding country rocks but has cooled and lithified before reaching the earth's surface.
intrusive	Rock which, when fluid, has penetrated other rocks and solidified before reaching the surface.
invasive native scrub	(Soil Landscape terminology) Refers to a range of native woody species (trees and shrubs) which tend to thicken in density resulting in a change of historic vegetation structure from grasslands or open woodlands to tree or shrub-dominated landscapes. This is a consequence of alteration of land use (including burning frequency), climatic fluctuation and/or other factors. It results in changes to pastoral productivity, habitat and landscape function.
invasive weeds	(Soil Landscape terminology) Plants that can substantially degrade valuable land to an extent that requires remedial action. Weeds are a serious threat to the natural environment and primary production. They displace native species, contribute significantly to land degradation, and reduce farm and forest productivity. Major invasions change the natural diversity and balance of ecological communities. These changes threaten the survival of many plants and animals because the weeds compete with native plants for space, nutrients and sunlight.

isohyet	A line on a map joining centres which receive equal amounts of rainfall.
J	
jarosite	Distinctive pale yellow deposits precipitated around old root channels and on ped faces under strongly oxidising, severely-acid conditions in acid sulfate soils. One of the most commonly used morphologic features to identify acid sulfate soils, although it is not always present.
jasper	A translucent, impure form of quartz with red, brown or green colouration.
Jurassic period	Geological period from 295 – 135 million years ago.
K	
K factor	(Soil Landscape terminology) The Unifed Soil Loss Equation includes a soil erodibility factor known as K (Wischmeier & Smith 1978). K factor is a derived index of the susceptibility of a soil to sheet and rill erosion. The formula that the Department of Environment and Climate Change's Interp software program used to derive K factor is the USLE modified for Australian conditions and based on that used in SOILOSS (Rosewell & Edwards 1988), with profile permeability modified to follow that used by Soil and Water Conservation Society (1993). If field data indicates the soil material is a moderately to strongly cemented pan, Pan is printed. Similarly, if the soil has a USCS classification of Pt, Peaty is printed. This is because cemented pans and peats are not usually considered erodible and are beyond the range of USLE parameters. The percentages of silt and fine sand are derived from analyses of non-dispersed fine earth particle size if they are available. Otherwise, Interp defaults to results for the fine earth particle size. If the K factor is <0.0001 or is negative, the K factor is presented as being zero. **Note:** K factor alone has very limited value unless it is used in conjunction with all other factors in USLE. See erodibility and erosion hazard.
Kandosol	(Australian Soil Classification Soil Order) Soils other than Hydrosols soils that have well-developed B_2 horizons in which the major part is massive or has only a weak grade of structure and which has a maximum clay content >15% in some part of the B_2 horizon.
karst	A pattern of unspecified relief and slope, typically with fixed deep erosional stream channels forming a non-directional disintegrated tributary pattern and many closed depressions without stream channels. Eroded by continuously active solution and rarely active collapse, the products being removed through underground channels.

	Typical elements are hillcrest, hillslope (dominant) and doline. Includes summit surface, valley flat, plain, alcove, drainage depression, stream channel, scarp, footslope and landslide, and talus.
Karst Soil Landscape	(Soil Landscape terminology) Soil landscapes dominated by solutional processes, particularly on limestone and related rock types. Soil parent materials include accumulations of less soluble minerals. Drainage patterns are deranged and solution hollows are common. Landform patterns may include tors, hillslopes and dolines.
Krasnozems	(Great Soils Groups classification) Deep, red strongly-structured clay soils with clay content gradually increasing with depth and weak horizon differentiation.
Kurosols	(Australian Soil Classification Soil Order) Soils with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B_2 horizon (or the major part of the entire B_2 horizon if <0.2 m thick) is strongly acid.

L

labile	A measure of weak plasticity used in a consistency test. The cube fractures and fragments are easily deformed.
lacustrine	Unconsolidated surface material deposited mainly in standing water such as lakes.
Lacustrine Soil Landscape	(Soil Landscape terminology) Result from infilling of lakes with sediments deposited in still water. Soil parent materials are usually fine-grained, well-sorted and often varved. Ground surfaces are level to gently inclined and slightly concave. Landform elements include lakes, playas and some oxbows and lagoons.
lagoon	A closed depression filled with water that is typically salty or brackish, bounded at least in part by forms aggraded or built up by waves or reef-building organisms.
lake	Water-filled closed depression or a large or small body of water surrounded by land, whether freshwater or brackish.
laminae	Thin sedimentary layers which are generally <5 cm thick.
laminate	Thinly-bedded, fine-grained sedimentary rock.
Land and Soil Capability, LSC	A land capability classification that builds on the Rural Land Capability (RLC) system developed in 1986 for NSW. It retains the eight classes of the earlier system but places additional emphasis on specific soil limitations and their management. The LSC assessment scheme uses the biophysical features of the land and soil to derive detailed rating tables for a range of land and soil hazards. Each hazard is given a rating between 1 (best, highest

	capability land) and 8 (worst, lowest capability land), and the final LSC class of the land is based on the most limiting hazard.
landform element	Part of the landform characterised by a distinctive slope, shape, size, form and type of geomorphological process (e.g. aeolian, alluvial) active on it. Typically, a landform pattern is formed from several landform elements.
landform pattern	Broad descriptive classification of the landform typically assessed within 300 m of the point of observation. Each landform pattern is typically formed from several related landform elements.
landscape	That part of the land's surface, generally extensive, being viewed or under study, that relates to all aspects of its physical appearance, including various vegetation associations and landforms. The underlying geology and soils, and land use might influence the character of a landscape.
landslide	Moderately inclined to very steep slope, eroded in the upper part and aggraded in the lower part by water-aided mass movement, characterised by irregular hummocks.
landslip	A general term used to encompass those landslides that are composed mainly of soil and underlying weathered material, are initiated by finite shear failure along one or more distinct slip facies and move downslope for only relatively short distances. In many instances, conventional soil conservation measures such as tree planting can be applied to affect their control.
laterite	A soil in which an indurated iron-rich layer usually overlies a mottled clay and a pallid clay.
Lateritic Podzolic Soil	(Great Soil Groups classification) The essential features of these soils are strong texture contrast with thick, sandy A horizons overlying mottled yellow-brown and red clay B horizons, an horizon of nodular pisolitic, or massive ironstone in the base of the A_2 and upper B horizon, a thick zone of coarsely mottled white, red and yellow clay below the B horizon grading into dominantly white clay above the kaolinised parent rock, and acid reaction throughout the profile (Stace *et al*. 1968, p.344).
lattice gilgai	Discontinuous elongate mounds and/or elongate depressions at approximately right angles to the contour. They usually occur on sloping land and commonly between linear gilgai on lower slopes and plains.
lava plain	Level to undulating with very low to extremely low relief typically with widely spaced fixed erosional stream channels which form a nondirectional, integrated or interrupted tributary pattern. Aggraded by volcanism (lava flow) that is generally relict, it is subject to erosion by continuously active sheet flow, creep, and channelled stream flow. Typical elements are plain, hillslope and streambed.
leached earths	Soils like Earths, but with a distinct bleached near surface (A_2) horizon.

leaching	The removal in solution of the more soluble minerals and salts by water seeping through a soil, rock, ore body or waste material.
lenticular	Soil particles are arranged around an elliptical or circular plane and are bounded by curved faces with considerable accommodation to the faces of surrounding peds; most vertices between adjoining faces are angular and acute.
leucoadamellite	A lighter-coloured form of adamellite which contains 0 – 30% of dark minerals.
leucocratic	A term describing light coloured igneous rocks i.e. rocks with <30% dark-coloured minerals.
leucogranite	A lighter-coloured form of granite containing 0 – 30% of dark minerals.
levee	Very long, very low, nearly level sinuous ridge, immediately adjacent to a stream channel, built up by overbank flow. Levees often occur in pairs bounding the two sides of a stream channel at the level reached by frequent floods; part of a covered plain. See also embankment.
lime	A naturally-occurring calcareous material used to raise the pH of acid soils and/or supply nutrient calcium for plant growth. The term normally refers to ground limestone ($CaCO_3$) but may include processed forms such as hydrated lime ($Ca(OH)_2$) or burnt lime (CaO). The processed forms are also effective for treating dispersible soils.
limestone	Non-clastic sedimentary rock consisting essentially of the carbonate minerals calcite and dolomite; may be organic, detrital or chemically precipitated.
linear gilgai	Long, narrow, parallel, elongate mounds and broader, elongate depressions at approximately right angles to the contour. They usually occur on sloping land. The vertical interval is usually <0.3 m and the horizontal interval is usually 5 – 8 m.
linear shrinkage	Linear shrinkage is the decrease in length of a soil sample (rabbled and sieved <0.425 mm) when oven-dried of the moisture content from the liquid limit. Shrinkage is expressed as a percentage of the original dimension. The method is described in Craze *et al*. (1993), Crouch *et al*. (1991) and AS1289.C4.1-1977. Linear shrinkage is a relatively tedious and expensive test that is done only on soils that are not sands, and when dispersion is <50% or when volume expansion tests fail to saturate or shrink. These conditions mask the relationship between volume expansion and shrink-swell behaviour (Mills *et al*. 1980).
lithic sandstone	A detrital sedimentary rock with mainly sand-sized particles consisting of rock fragments, quartz and feldspar set in a finer-grained matrix.
lithified	Newly-deposited sediments which have been compacted or cemented to rock form.
lithofeldspathic	Containing abundant fragments of feldspar-rich rocks.

Lithosol	(Great Soil Groups classification) A shallow soil showing minimal profile development and dominated by the presence of weathering rock and rock fragments. Lacking horizons other than an A_1 (one layer only).
littoral complex	Mixed growth forms; mosaic of mangroves, low shrubs, forbs, sedges and swamp grasses adjacent to estuarine or tidal areas.
loam	A medium-textured soil of approximate composition 10 – 25% clay, 25 – 50% silt and <50% sand. The bolus is coherent and rather spongy; smooth feel when manipulated but with no obvious sandiness or silkiness; may be somewhat greasy to the touch if much organic matter present; will form ribbon of ~25 mm; clay content ~25%.
local relief	The difference in elevation between the high and low points of the landscape.
localised occurrence	Relates to a soil or landscape hazard or quality which is confined to certain elements of a soil landscape
loess	A blanket deposit of buff-coloured calcareous silt. It is homogeneous, non-stratified weakly coherent, porous and friable. A rude vertical parting allows it to stand in steep or vertical faces. Loess covers wide areas in northern Europe, eastern China and the Mississippi Valley. See also parna.
logged native forest	Stands of native forest which have been or are being commercially logged.
loose	Incoherent mass of individual particles or aggregates forms the soil surface. The surface is easily disturbed by pressure of forefinger.
low hills	Gentle to very steep slopes of low relief typically with fixed erosional stream channels, closely to very widely-spaced, which form a non-directional or convergent, integrated, tributary pattern. There are continuously active sheet flow, creep and channelled stream flow. Typical elements are hillcrest, hillslope (dominant), drainage depression and stream bed. Includes footslope, alcove, valley flat, gully, tor, summit surface, landslide and doline.
low shrubland	Canopy cover <30% and maximum height <2 m; sparse upper stratum with a lower stratum of grasses and forbs.
lower order stream	Streams close to the source and with none too few tributaries.
lunette	Elongated, gently curved, low ridge, built up by wind on the margin of a playa, or intermittent lake, typically with a moderately inclined wave-modified slope towards the playa, and a gentle, outer slope gradient.

M

maar	A level-floored, commonly water-filled closed depression with a nearly circular steep rim excavated by volcanism.
macropores	Spaces generally <2 mm in diameter in soil fabric.
made land	Where human activity has brought about severe disturbance to the natural landscape features. It includes irrigation areas, reclaimed land and restored mining areas. Typical elements are fill-top (dominant), cut-over surface, cut face, embankment, berm and trench and include mound, pit and dam.
magma	Molten fluid formed within the crust or upper mantle of the earth which may consolidate to form an igneous rock. Magma which is extruded onto the surface of the rock becomes lava.
mallee form, mallee habit	Growth form in a tree (usually *Eucalyptus* spp.) which has many stems arising from its base.
manganic horizon	Horizon containing >20% (visual abundance estimate) of black manganiferous nodules or concretions which are mostly uncemented, and which has a thickness of ~0.1 m. Most nodules also contain some iron.
manganiferous	Consisting of or containing oxides of manganese.
manganocrete	Manganiferous duricrust consisting of manganese dioxide (MnO_2) cemented talus deposits.
mangans	Coatings of manganese oxides or hydroxides. The material may have a glazed appearance and is very dark brown or black.
mangroves	Shrub or small tree growing in salt (or brackish) water and characterised by the presence of pneumatophores.
map area reference	Refers to a certain area (as opposed to a point) and is defined as the last significant coordinates given in the map reference.
marble	Limestone which has been recrystallised by heat and pressure during metamorphic processes.
marine plain	Plain eroded or built up by waves, tides or submarine currents and raised above sea level.
marine sediments	Sediments transported and deposited by the sea.
Marine Soil Landscape	See Beach/Barrier Soil Landscape.
mass movement	Downslope displacement of unstable soil material on slopes. Its occurrence depends on profile drainage, soil mineralogy and slope

	morphology. It might occur as a catastrophic event, e.g., mud slide, landslide, or as a slow incipient process, e.g., creep.
mass movement hazard	(Soil Landscape terminology) Mass movement is a general term for several forms of slope failure including rockfalls and earth creep, slumps, slips and flows on steep, and often wet, slopes. Soil features include shear planes, slickensides and colluvial materials. Mass movement may lead to severe damage to buildings, roads and services, or may result in recurrent problems such as shifting foundations. Mass movement hazard is assessed by the abundance of mass movement evidence.
massif	A section of the earth's crust demarcated by faults or flexures that tends to maintain its internal structure when displaced. Also refers to the group of mountains formed by such a structure.
massive	The condition of a soil layer in which the layer appears as a coherent or solid mass largely devoid of peds.
matrix	The smaller, grain-sized material that is typically a cementing agent within a soil or rock in which larger particles are embedded. May also be referred to as sulfuric materials.
meadow soils	Brownish-black organo-mineral surface soils with well-developed structure becoming paler and less organic with depth. The watertable is present for at least part of the year. See also normal meadow soils.
meander plain	A floodplain with widely spaced, rapidly migrating, moderately deep alluvial stream channels which form a unidirectional integrated non-tributary network. There are frequently active aggradation and erosion by channelled streamflow with subordinate aggradation by overbank streamflow. Typical elements are stream channel, scroll and plain (dominant). Includes oxbow. See also alluvial plain; floodplain.
meandering	The natural winding of stream channels across their floodplain, resulting from a complex geomorphological process and involving erosion on the outside streambank and alluvial deposition on the inside.
megaxenolith	Large rock fragments from a different type of rock that are imbedded in a granitic rock.
melacic horizon	Same as melanic horizon but pH is <5.5 and there is no structure requirement.
melanic horizon	Dark surface (black when moist) of near-surface horizon that has an insufficient organic carbon to qualify as a humose horizon and has little, if any, evidence of stratification. The pH is >5.5.
melonhole gilgai	Irregularly distributed large depressions usually >3 m in diameter, or greatest dimension, subcircular or irregular and varying from closely spaced in a network of elongate mounds to isolated depressions set in an undulating shelf with occasional small mounds. Some depressions

	may also contain sinkholes. The vertical interval is usually >0.3 m and the horizontal interval is usually 6 – 50 m. The surface is almost level.
mesotrophic	Soil with effective cation exchange capacity (eCEC) divided by 100 g from 5 – 15 cmol(+)/kg clay.
Mesozoic era	Geological era comprising the Triassic, Jurassic and Cretaceous periods, ranging from 225 – 70 million years ago.
metamorphic	Rocks that have been changed in their mineralogical, textural or small scale structural compositions by the action of heat and/or pressure.
metamorphic complex	A combination of many types of rocks which have been metamorphosed together.
metasediments	Partially-metamorphosed sedimentary rocks.
meteor crater	Rare; comprising a circular closed depression with a raised margin; mainly of low to high relief and having a large range of slope values, without stream channels, or with a peripheral integrated pattern of centrifugal tributary streams. The pattern is excavated, heaved up and built up by meteor impact. Typical elements are crater, scarp, talus, footslope, plain, hillcrest and hillslope. See also crater.
mica schist	Schist formed under a higher metamorphic grade with an abundance of micaceous minerals, and sometimes garnet.
microcline	($KAlSi_3O_8$) The low-temperature form of potassium feldspar, commonly found in granitic rocks.
microgranite	Medium-grained acid igneous rock having very similar mineralogical and chemical properties to granite.
migmatic	Refers to mixing of rocks from two different sources to create a new rock. This might occur when an invading granitic material reacts with a pre-existing metamorphic rock.
mineralogy	The study of minerals.
Miocene epoch	Geological epoch, part of the Tertiary period, from 24 – 5.3 million years before present. An epoch of the Neogene sub-period of the Cenozoic era.
moderate pedality	The soil contains peds which can be identified but are not distinct. Although not distinct in an undisturbed soil, peds are well formed and evident. When displaced, 30 – 70% of the soil material consists of peds (Northcote 1979).
molality	Molality is the number of moles of solute dissolved in one kilogram of solvent. Notice the two key differences between molarity and molality: 1. Molality uses **mass** *rather than volume* and uses **solvent** *instead of solution.* 2. Unlike molarity, molality is independent of temperature because mass does not change with temperature. If you were to place 90

	grams of glucose (0.50 moles) in a flask and then add one kilogram of water, then you would have a 0.50 molal solution. Molality is usually denoted with lower case m, i.e., a 0.50 m solution.
molarity	Molarity is the number of moles of solute dissolved in one litre of solution. For example, if you have 90 g of glucose (molar mass = 180 g per mole), then this is (90 g)/(180 g/mol) = 0.50 moles of glucose. When you place this in a flask and add water until the total volume = 1 litre, you would then have a 0.5 molar solution. Molarity is usually denoted with a capital M i.e. a 0.50 M solution. Recognise that molarity is moles of solute per litre of **solution,** *not per litre of solvent*. As well, recognise that molarity changes slightly with temperature because the volume of a solution changes with temperature.
montmorillonite	Clay materials comprising a group of aluminosilicate minerals with a 2:1 expanding crystal lattice structure. They are reactive clays generally with high shrink/swell potential and high cation exchange capacity.
monzonite	Plutonic rock of orthoclase, plagioclase and <2% quartz; intermediate between syenite and diorite.
morphology	Form and structure.
mottled horizon	Horizon in which mottle abundance is >10% (visual abundance estimate) and the contrast between colours is distinct and prominent.
mottling	The presence of more than one soil colour in the same soil horizon, not including different nodule or cutan colours
mound	A hillock built up by human activity.
mountains	Moderate to precipitous slopes of very high relief with fixed erosional stream channels which are closely to very widely spaced and form a non-directional or diverging integrated tributary network. There is continuously active erosion by collapse, landslide, sheet flow, creep, and channelled stream flow. Typical elements are hillcrest, hillslope (dominant), streambed. Includes talus, landslide, alcove, valley flat, scarp, cirque and footslope. See also hills; low hills; plain; rises.
mudstone	A fine-grained, dark-coloured sedimentary rock formed from lithified mud; like shale but more massive.
mulch	A natural or artificial layer of plant residue or other material on the soil surface which provides protection against erosion and aids plant establishment mainly by reducing moisture loss. It may also increase infiltration and minimise temperature fluctuations.
N	
national/state parks	Land in government ownership for conservation and recreation purposes which is generally in a relatively undisturbed condition.

native vegetation	Indigenous pasture, bushland and/or timber species adapted to the prevailing environmental conditions such as climate, soils and natural grazing patterns.
native/voluntary pasture	Cleared or lightly-wooded land with a ground cover of grasses and or legumes which are either native species or naturalised (self-sown) exotic species.
nephelinite	Extrusive rock consisting of pyroxene and nepheline.
Neutral to Alkaline Peat	(Great Soil Groups classification) These peats can be black and highly granular, dark brown and fibrous, or of some intermediate character and range in depth from ~30 cm to many centimetres. Lenses of shells and patches of soft carbonates sometimes occur irregularly within the peat and occasionally on the surface.
nodulation	A process, often one of alternating soil moisture conditions, whereby minerals are transported in solution and reprecipitated to form sub-circular concretions.
nodule	Irregular rounded mineral aggregate; no concentric or symmetric interior fabric but may have hollow interior; usually easily separated from the soil matrix.
Non-calcic Brown Soil	(Great Soil Groups classification) Very like Red-brown Earths but without an A_2 horizon. They have a carbonate-free solum and a neutral to slightly alkaline (with lower base saturation) B horizon. They are also generally thinner soils, 40 – 80 cm deep.
non-cohesive soils	(Soil Landscape terminology) Loose, sandy soils can be subject to severe wind erosion, gully erosion and batter failure. Batters with slopes >25% should be supported with retaining walls. Batters with slopes <25% should be revegetated quickly.
normal gilgai	Irregularly distributed small mounds and subcircular depressions varying in size and spacing. The vertical interval is usually <0.3 m, and the horizontal interval is usually 3 – 10 m. The surface is almost level.
normal marsh soils	Grey topsoil becoming lighter with depth which is usually saturated with water to the soil surface.
normal meadow soils	Meadow soils with a podsolised layer.
O	
Oligocene epoch	Epoch of the Tertiary period, 38 – 22.5 million years ago.
olivene	Weatherable greenish silicate mineral common in basic rocks often as phenocrysts.

open-forest	Vegetation structure consisting of trees <30 m tall with a canopy cover 30–70% of ground area; dry understorey of smaller trees, shrubs and herbs.
orchard/vineyard	Land used for production of fruit trees and/or vines.
Ordovician period	Geological period from 525 – 440 million years ago.
organic soils	(Soil Landscape terminology) Soils with large amounts of organic carbon (generally >12% [Isbell 2002]) such as peats and sandy peats are generally unsuitable for use as engineering materials because they have low wet-bearing strength and their physical properties may be subject to change through decay. They are generally well-structured for plant growth and have high waterholding capacities; however, they are often very acid and may require large quantities of lime and nitrogen as well as other nutrients and trace elements for optimum plant growth. Most topsoil contains sufficient organic matter to be unsuitable for engineering purposes. Also, highly organic soil materials located in swampy areas tend to suffer significant structural decline when drained.
Organosols	(Australian Soil Classification) Soils not regularly inundated by saline tidal waters and which have >0.4 m of organic materials in the upper 0.8 m either extending down from the surface or cumulatively or have organic materials extending from the surface to >0.1 m depth directly overlying rock or other hard layers.
orthoclase	($KAlSi_3O_8$) A common rock-forming mineral of the feldspar group.
outcrop	The exposure at the surface of rock that is inferred to be continuous with underlying bedrock.
outer barrier	Barrier characterised by the presence of sand dunes with moderate relief and minimal or no soil development. Considered to be Holocene in age and formed when sea levels generally reached their present stage. Occurs on the seaward side of the barrier system.
overland flow (sheetwash)	Water flowing in a thin layer over the land surface. In a soil conservation context, it is usually storm runoff and may lead to sheet erosion.
ox-bow	Long, curved, commonly water-filled closed depression, eroded by channelled stream flow, but closed due to aggradation by channelled or overbank stream flow during the formation of a meander plain; the floor may be aggraded by overbank stream flow, wind, and biological (peat) accumulation.
oxidation	To combine with oxygen resulting in the removal of one or more electrons from an atom or ion, or group of atoms. Oxidation is important to the formation of acid sulfate soils by converting pyrite to jarosite and sulfuric acid.

P

pagoda	Rock formation formed from the different rates of weathering of alternative layers of sandstone and ironstone. The rock formations resemble beehives in general morphology.
pagoda	Lake extant during a prior geological period.
Palaeozoic era	Geological era 600 – 230 million years ago.
pan	Indurated and/or cemented soil layer that is denser and less permeable than the layers above and below it and generally impenetrable to plant roots.
parent material	The geologic material from which a soil profile develops. It may be bedrock or unconsolidated materials including alluvium, colluvium, aeolian deposits or other sediments.
parna	A deposit of dust (suspended windblown mineral material) differentiated from loess by its higher clay content.
particle size analysis, PSA	(Soil Landscape terminology) The laboratory determination of the amounts of the different separates in a soil sample such as clay, silt, fine sand, coarse sand and gravel. The amounts are normally expressed as percentages by weight of dry soil and are determined by dispersion, sedimentation, sieving, micrometry or combinations of these techniques. Size classes for soil fractions are based on the international scale (cited in McDonald *et al*. 1990): • Clay— <0.002 mm • Silt— 0.002 – 0.02 mm • Fine sand— 0.02 – 0.2 mm • Coarse sand— 0.2 – 2 mm • Gravel— 2 – <60 mm.
particle size analysis, PSA, non-dispersed	(Soil Landscape terminology) Analysis of non-dispersed particle size is very like conventional analysis of particle size of the fine earth fraction, except that soils are not chemically dispersed, but are mechanically shaken. Particle sizes therefore tend to be coarser than those produced by conventional analysis of particle size. To estimate erodibility (K values) of the USLE, Loch and Rosewell (1992) recommend the use of non-dispersed particle size analysis. Non-dispersed particle size analysis is usually adapted for soils that are identified as being self-mulching and highly aggregated. Within these soils, the differences between conventional and non-dispersed particle size analyses are greatest. Highly aggregated soils have a dispersion percentage of less than 10%, are very strongly structured and are usually sub-plastic (bolus texture grade increases by at least two grades during working). When not compacted, or smeared, highly aggregated soils behave in a

	similar manner to soils with much coarser particle gradings. For example, when subjected to concentrated water flows, highly aggregated sub-plastic polyhedral clays can be expected to erode in a similar manner to angular fine gravels.
particle size analysis, PSA, fine earth	(Soil Landscape terminology) The fine earth fraction of a soil is the portion that is composed of particles <2 mm in diameter and does not include gravel. It relates to the guides for field texture derived from Northcote (1979), based on percentages of particle size, and to texture triangle diagrams such as the one depicted in Hazelton and Murphy (1992). Field texture is also influenced by sesquioxides, carbonates, organic matter, clay mineral type, base saturation and cation dominance. The relationship between fine earth particle size analysis and field texture requires very careful interpretation. The fine earth fraction is calculated for each soil. The formula is: Fine earth fraction % = whole soil % × 100/(100 - gravel %) Most soil test results are reported for the fine earth fraction unless otherwise stipulated. Results that relate to the whole soil, including coarse fragments, are referred to as being 'rock-adjusted'.
pasture	Grasses, legumes and/or other herbage (i.e. vegetation) used or suitable for the grazing of animals (e.g. livestock). The term includes land covered by such herbage and used or suitable for grazing. Annual/perennial pasture consists largely of annual/perennial grasses and/or legumes respectively. See also improved pasture; native/voluntary pasture.
peat	Accumulation of partially decayed organic material. Varies in the level of decomposition of the material and its content of mineral soil particles.
peaty horizon	A surface or near-surface layer of organic materials >0.2 m thick overlying mineral soil. It does not qualify as an Organosol.
Peaty Podzol	(Great Soil Groups classification) Soils consisting essentially of some depth of acid fibrous peat or sandy peat overlying sandy mineral soil that has most of the features of humus podzols but generally lacks a distinct A_2 horizon.
ped	An individual, natural soil aggregate. See also dominant peds.
ped shape	Refers to the shape of natural soil aggregates. See also platy; lenticular; prismatic; columnar; polyhedral; angular blocky; sub-angular blocky; granular.
pedal	Describes a soil in which some, or all, of the soil material occurs in the form of peds in the moist state.
pedality	Refers to the relative proportion of peds in the soil (as strongly pedal, weakly pedal or non-pedal).
pediment	Gently inclined to level feature of extremely low relief; usually with numerous, rapidly migrating, very shallow, incipient stream channels which form a centrifugal to diverging integrated reticulated pattern.

	Underlain by bedrock, eroded and locally aggraded by frequently active channelled stream flow or sheet flow with subordinate wind erosion. Characteristically lies downslope from adjacent hills with markedly steeper slopes. A typical element is a plain streambed. See also sheet-flood fan; alluvial fan.
pediplain	Level to very gently inclined landform pattern with extremely low relief and no stream channels, eroded by barely active sheet flow and wind. Largely relict from more effective erosion by streamflow in incipient stream channels as on a pediment. A typical element is a plain.
pelite	An aluminium rich rock formed through metamorphism of clay-rich sediments.
peneplain	Level to gently undulating landform pattern with extremely low relief and sparse, slowly migrating stream channels which form a non-directional integrated tributary pattern. It is eroded by barely active sheet flow, creep, and channelled and overbank stream flow. Typical elements are plain (dominant) and stream channel.
perched watertable	The surface of a local zone of saturation held above the main body of groundwater by an impermeable layer, usually clay, and separated from it by an unsaturated zone.
periodically frozen soil (frost action potential)	(Soil Landscape terminology) Frost action potential is a rating for the susceptibility of the soil to upward or lateral movement by the formation of segregated ice lenses. It rates the potential for frost heave and the subsequent rapid loss of soil strength when the ground thaws and the ice crystals and lenses within the soil melt. Unequal heaving and subsidence upon thawing can crack or tip concrete slabs. In Australia, this hazard is generally recognised by the presence of large ice crystals in topsoils. Although most soils in Australia have zero frost action potential, a few colder areas may exhibit low frost action potential where damage to buildings and roads is unlikely, but still a possibility (Soil Survey Staff 1993).
permanent wilt point, PWP	(Soil Landscape terminology) Permanent wilting point arbitrarily represents the amount of soil moisture remaining when plant foliage begins to die due to moisture stress (McIntyre 1974). It is generally accepted to be equivalent to soil water content at a suction of 1.5 MPa, although the level varies between plant species, with desert species often surviving at much lower levels. Gravimetric water content is converted to volumetric water content by multiplication of soil bulk density. If bulk density is not available, it is assumed to be 1.4. Permanent wilting points are not generally affected by sample handling. Soils with a high permanent wilting point contain a relatively large percentage of water when plants start to wilt due to drought. Dry soils with low permanent wilting points require less water (less rainfall after a prolonged dry spell) for plants to begin to regrow.

permanently high water tables	(Soil Landscape terminology) Problems often occur where water tables are permanently within 2 m of the surface. The surface soil materials may dry out, but sub-surface soils are often saturated. In these soils, for example, septic effluent disposal often results in groundwater pollution
permeability	The measure of a profile's potential to transmit water (saturated hydraulic conductivity, K_s or K_{sat}). An intrinsic property of the soil profile, independent of climate and drainage, it is controlled by the least permeable layer in the profile. It is inferred from attributes of the soil such as structure, texture, porosity, cracks and macropores, and shrink-swell properties.
permeability, high	(Soil Landscape terminology) Soils that drain water quickly. They usually have coarse textures (sands) and many interconnecting pores. They are not suitable for absorbing effluent from septic systems because liquid drains rapidly into the groundwater where it can cause pollution and potential health problems elsewhere. Soils with high permeability often have low waterholding capacities. Seedlings and newly established plants require regular, light irrigation.
permeability, low	(Soil Landscape terminology) Soils that usually have very slow drainage and are likely to pond water for long periods. They usually have clayey textures and mottled or greyish colours. They are not suitable for absorbing effluent. Special drainage may be required. They may also be sodic and have low wet bearing strengths.
Permian period	Period of geological time, 225 – 280 million years before present.
petroferric horizon	Ferruginous or ferromanganiferous nodules or concretions cemented in place into indurated blocks or large irregular fragments.
petrology	The study of the natural history of rocks.
petroreticulite horizon	Reticulate horizon that is always indurated in the greater part both before and after exposure.
pH	A measure of the acidity or alkalinity of the soil. A pH of 7.0 denotes neutrality. Higher values indicate increasing alkalinity and lower values indicate increasing acidity. The scale is logarithmic, i.e., a pH of 4.0 is 10 times more acidic than a pH of 5.0. In soil landscape reports the following ranges have been used: • <3.5— extremely acid • 3.6 – 4.5— strongly acid • 4.6 – 5.5— moderately acid • 5.6 – 6.5— slightly acid • 6.6 – 7.5— neutral • 7.6 – 8.5— slightly alkaline • 8.6 – 9.5— moderately alkaline • 9.6 – 10.5— strongly alkaline • >10.5— extremely alkaline

pH 1:5 soil:0.01M $CaCl_2$ (pH $CaCl_2$)	(Soil Landscape terminology) This is the activity of the negative logarithm (base 10) of the number of hydrogen ions in a suspension of 1:5 soil:0.01M $CaCl_2$. This test method is considered to approximate average soil solution calcium and salinity levels (Russell 1973). Conyers and Davey (1988) found that pH in 1:5 soil:0.01M $CaCl_2$ is usually 0.5 to 1.0 units less than pH in 1:5 soil:water except in saline and some variable charge soils where the difference may be smaller (Russell 1973). 0.75 pH units are added to pH values in 1:5 soil:0.01M $CaCl_2$ to approximate pH in 1:5 in soil:water. pH in 1:5 soil:0.01M $CaCl_2$ is not appropriate for soils rich in calcium carbonate.
pH 1:5 soil:water (pH H_2O)	(Soil Landscape terminology) This is the activity of the negative logarithm (base 10) of the number of hydrogen ions in a suspension of 1:5 soil:water. It is the *de facto* standard pH measurement for most soil test interpretations; however, pH measured in 1:5 in soil:water is sensitive to seasonal variations in the pH of soil solutions.
pH buffering capacity, expected	(Soil Landscape terminology) pH buffer capacity is the amount of acid input required to reduce pH by one unit. It is not measured directly, but is derived from the regression equation presented in Helyar *et al*. (1990). Expected buffer capacity should not be used to directly calculate lime requirements, nor the rate of acidification. Instead, expected buffer capacity can be used to compare the relative resistance to increase in acidity of different soil types.
phenocrysts	Large crystals set in a fine-grained ground mass.
phyllite	A fine-grained low-grade regionally metamorphosed sedimentary rock intermediate in grade between a slate and a schist. They typically have a distinctive shiny surface caused by the reorientation of mica minerals along cleavage planes.
pisolitic	Spheroidal concretions cemented together.
pit	A closed depression excavated by human activity. This term usually relates to mining or quarrying.
plagioclase	A commonly found series of feldspars varying in composition from $NaAlSi_3O_8$ to $CaAl_2Si_2O_8$.
plain	Level to undulating or, rarely, rolling landform pattern with extremely low relief (<9 m). See also mountains; hills; low hills; rises.
planeze	That stage in the erosion of shield volcanoes wherein dwindling sectors of the constructional surfaces (planezes) survive on the ridges between deeply eroded major consequent valleys (Cotton 1944).
plant available waterholding capacity, PAWC	(Soil Landscape terminology) PAWC is the amount of water available to plants from when the soil stops draining water to when the soil becomes too dry to prevent permanent wilting. PAWC is calculated by subtracting permanent wilting point from field capacity; therefore, it is influenced by the same sampling effects as

	field capacity. Field capacity >100% can occur when there is a high clay content, high shrink-swell potential and/or high organic matter. Soils with a high PAWC can store larger amounts of soil water for plant growth, and need watering less often, compared to soils with a low PAWC. Rankings are based on volumetric ratings of United States Department of Agriculture (1983) for Udic (humid-adequate moisture) and Ustic (semi-humid semi-arid) soil moisture regimes of United States Department of Agriculture Soil Taxonomy (Soil Survey Staff 1975).
plant available waterholding capacity, PAWC, swelling soils adjustment	Swelling soils in the field are confined by the material above, below and around them. This limits the potential for a soil to swell and to absorb water. In laboratory testing, soil materials are unconfined and swell to their full potential. Laboratory samples tested are based on crushed and sieved material. These factors combine to over-estimate field capacity and plant available waterholding capacity for swelling soils. Errors may be compounded by bulk density estimates. In such soils, test results should be applied with caution.
plant available waterholding capacity, PAWC, rock and salt adjustment	Rock adjusted (RA) PAWC: it is assumed that rocks do not contribute to PAWC. Salt adjusted (ECe) PAWC: a major physiological effect of salinity is to reduce the available water for plants by increasing the osmotic pressure in soil and thus increase the permanent wilting point. Salinity further reduces rock-adjusted PAWC by ~25% for each 4 dS/m of ECe (United States Department of Agriculture 1983).
plant available waterholding capacity, PAWC, low	(Soil Landscape terminology) Soil materials with low available waterholding capacity can store only limited amounts of water that can be extracted by plants. Plants growing in these soils require small and frequent applications of water for optimum growth. PAWC is of greatest importance in areas with seasonal rather than regular or highly unreliable rainfall. PAWC ratings in soil test results are: • very low (<5) • low (5 – 10) • moderate (10 – 15) • high (15 – 20) • very high (>20). In the ‘Soil limitations for each soil material’ table (if included) the rating of low PAWC is more broadly defined as <10.
plastic	Describes soil materials which are in a condition that allows them to undergo permanent deformation when force is applied without appreciable volume change or elastic rebound or without rupture.
plasticity	(Soil Landscape terminology) Plastic state occurs at water contents where soils deform or change shape without change in volume. It occurs between the semi-solid (crumbly) and liquid state and is defined as the difference between the plastic and liquid Atterberg limits (Hicks 1991). A soil with high plasticity has plastic properties over a wide range of moisture contents.

	Highly plastic soils are typically high in clay content and deform easily when mechanically stressed in the moist to saturated state. They are often tough and hard when dry, do not support loads well and have poor trafficability when wet. Soils with no or low plasticity change from solid to liquid with little change in moisture content and may be prone to mass movement (Hazelton & Murphy 1992). Highly plastic soils can be very sticky, are unsuitable for foundations and usually have low wet bearing strengths and high shrink-swell potential. • Highly plastic (HP) soils— USCS classifications of CH-CL, OH-CL, CL-OH, Pt, CH-OH, OHCH, CH and MH. • Moderately plastic (MP) soils— USCS class of CL-CH, CL, and OH. • Low plasticity (LP) soils— USCS classes CL-ML, ML-CL, ML, CL and OL. • Non-plastic (NP) soils— all other USCS categories and are sandy or gravelly.
plateau	Level to rolling landform pattern with plains, rises or low hills standing above a cliff, scarp or escarpment that extends around a large part of its perimeter. A bounding scarp or cliff may be included or excluded; a bounding escarpment would be an adjacent pattern. Typical elements are plain, summit surfaces and cliff. Includes hillcrest, hillslope, drainage depression, rock flat, scarp and stream channel.
platy	Soil peds are arranged around a horizontal plane and bounded by relatively flat horizontal faces with accommodation to the faces of surrounding peds.
playa	A shallow, closed depression flooded intermittently and, at other times, displaying a surface salt or mud.
playa plain	Level landform pattern with extremely low relief, typically without stream channels; aggraded by rarely active sheet flow and modified by wind, waves and soil phenomena. Typical elements are playa, lunette and plain.
Pleistocene epoch	First epoch of the Quaternary period, 2 million – 10,000 years before present.
pluton	A body of igneous rock formed beneath the surface of the earth by the cooling and solidification of magma.
plutonic rocks	Igneous rocks (e.g. granite) which have cooled and solidified at great depth.
podosol diagnostic horizon	Various B horizons consisting of alluvial accumulations of amorphous organic matter-aluminium and aluminium-silica complexes with or without iron in various combinations.
Podosol	(Australian Soil Classification) Soils with B horizons dominated by the accumulation of compounds of organic matter, aluminium and/or iron.

Podzol	(Great Soil Groups classification) Acid sandy soils with strongly differentiated horizons including a bleached horizon above a coffee-coloured pan and coloured subsoil.
point bar	Elongated, gently to moderately inclined low ridge within the stream channel built up by channelled streamflow.
polyhedral	Soil peds are arranged around a point and bounded by more than six relatively flat, unequal, dissimilar faces. Re-entrant angles between adjoining faces are a feature. There is usually considerable accommodation of ped faces to the faces of surrounding peds. Most vertices are angular.
polymictic	A term used to describe conglomerates whose constituent gravels, stones and cobbles originate from many different rock types and compositions.
poor moisture availability	(Soil Landscape terminology) When moisture availability is low, soil is referred to as being droughty. These soils have very limited soil water storage in comparison with other soils in the same climate zone. Freely draining soils or shallow soils, particularly those that do not receive run-on or allow easy entry of water to plant roots, are prone to drought.
poor seedbed conditions	(Soil Landscape terminology) Surface soil materials with properties that create difficulty in preparing adequate seedbed conditions, may be naturally cloddy, hard-setting, sandy, sodic or dispersible. Poor seedbed conditions are associated with the following soil contents: very low organic matter, very high or low clay, and high silt and fine sand.
porosity	The degree to which the soil mass has interconnected pores or cavities, generally expressed as a percentage of the whole volume of a soil horizon which is unoccupied by solid particles. It influences soil drainage characteristics.
porphyritic	A term which describes igneous rocks containing relatively large crystals set in a finer grained material (or groundmass).
porphyry	Rock containing conspicuous phenocrysts (large crystals) in a fine-grained matrix.
potential acid sulfate soils	Soil material which is waterlogged and contains oxidisable sulfur compounds, usually ferrous iron disulfide (pyrite, FeS_2) which has a field pH of ≥4 (1:5 soil:water) but will become severely acid when oxidised. May also be referred to as sulfidic materials. See also actual acid sulfate soils.
Potential/known discharge areas	(Soil Landscape terminology) Occur where water tables are liable to approach or contact the ground surface and become springs. When this occurs, the ground often becomes wet or boggy and may become saline and quickly erode to form scalds.
Potential/known recharge areas	(Soil Landscape terminology) Areas with highly permeable, generally non-saline soils and fractured geology can allow infiltration to

	contribute to underground water tables. Recharge areas may need special long-term management strategies, crop rotations or plantings to prevent rising water tables and salinity elsewhere.
physiographic region	A region with similar geological and topographic patterns and climate.
Prairie Soils	(Great Soil Groups classification) Moderately deep, mildly acid to mildly alkaline soils with thick, dark, moderately-structured topsoils.
Principal Profile Form, PPF	The end-point of the Factual Key soil classification system (Northcote 1979). A PPF code, e.g., Ug5.16, Gn2.23 or Dy3.41, describes the soil profile to an extent where it is possible to make a reasonably concise statement about its characteristics. An extended PPF may include further information describing the surface soil in more detail and/or material below the solum.
prior stream	Long, generally sinuous low ridge built up from materials originally deposited by channelled stream flow along the line of a former stream channel; may include a depression marking the old stream bed and relict levees.
prismatic	Soil peds are arranged around a vertical axis and are bounded by well-defined, relatively flat faces with considerable accommodation to the faces of surrounding peds; vertices between adjoining faces are usually angular.
Proctor Maximum Compaction Test	This test measures the level of soil compaction achieved with a standard compactive effort at a range of moisture contents. It provides a guide for the optimum moisture content for compaction.
productive arable land	(Soil Landscape terminology) Areas of highly productive arable or productive horticultural land are relatively rare within NSW and have long-term value. Special planning consideration should be given to degradation, sterilisation or alienation of potentially highly productive land by inappropriate land use, tenure or zoning. Productive arable land is a physical land assessment and does not consider additional social and economic factors used to determine prime agricultural land. Prime agricultural land is identified as Class 1, 2 and 3 land on Agricultural Land Classification Maps (Hulme *et al*. 2002) produced by the NSW Department of Primary Industries.
profile	A column of soil extending downwards from the soil surface through all its horizons to parent material, other substrate material or to a specified depth (McDonald *et al*. 1990). Each profile is uniquely identified by its number and the geographic location of its site. Soil profiles are grouped into larger parent entities called surveys. Every survey has its own unique name and number.
pyrite, pyrites	The cubic crystalline form of ferrous disulfide (FeS_2); the most common sulphide mineral.
pyroclastic	Term used to describe rocks consisting of fragmental material which has been blown into the atmosphere by the explosive activity of volcanoes.

Q

quarrying/mining land	Land used for extractive industries, e.g., for gravel, sand, coal, metals or minerals, also includes associated uses such as spoil dumps, infrastructure and rehabilitated former mining/quarrying areas.
quartz	(SiO_2) The most common silica mineral.
quartz sandstone	A detrital sedimentary rock with mainly sand-sized quartz particles cemented by silica or carbonates, and with little fine-grained matrix material.
quartzite	Regionally or thermally metamorphosed rock in which quartz is the primary constituent; grains have recrystallised into an interlocking mosaic texture with little or no trace of cementation.
quartz-lithic sandstone	A detrital sedimentary rock with mainly sand-sized particles consisting of rock fragments, quartz and feldspar set in a finer-grained matrix.
Quaternary period	Period of geological time from 2.6 million years ago to the present, covering the Holocene and the Pleistocene epochs.

R

rainforest	Wet forest in which mesophytic species dominate. Tree species diversity is high and canopy cover is 70 – 100%. Emergents, lianas, ferns and epiphytes are usually present. Eucalypts, when present, are usually canopy emergents.
rangeland	Land used for extensive grazing of sheep, cattle or other domestic stock. Rangeland vegetation is typically native or naturalised pasture. The area, in general, is often considered to receive insufficient rainfall to support the economic production of crops on a regular basis, and will generally support only low stocking densities.
reactive soil	A term used in the construction industry to describe a soil that changes volume (shrink-swell) with changes in moisture content. This can damage foundations.
rectilinear	Straight-sided. When used to describe a hillslope, this describes a slope that is essentially straight in cross-section with little or no convexity or concavity.
Red and Brown Hardpan Soil	(GSG classification) These soils have simple, shallow to moderately deep profiles of red earthy and massive soil sharply overlying an indurated pan resulting from silica cementation and clay deposition.
Red Calcareous Soil	See Grey-brown and Red Calcareous Soil.

Red Clay	See Grey, Brown and Red Clay.
Red Earth	(Great Soil Groups classification) Massive, reddish sandy profiles with a gradual increase in clay content with depth over a diffuse to gradual boundary.
Red Podzolic Soil	(Great Soil Groups classification) Strongly-differentiated duplex soils with light to medium textured A_1 horizon over a pale or bleached A_2 over a reddish, firm to friable B horizon with generally polyhedral structure.
Red-brown Earth	(Great Soil Groups classification) The characteristic features of these soils are grey-brown to red-brown loamy A horizons, weakly structured to massive, an abrupt to clear boundary between A and B horizons, and brighter brown to red clay B horizons with well-developed medium prismatic to blocky structure.
regolith	Mantle of loose and weathered material overlying the bedrock.
relict landform	Landform in which the formative geomorphological processes are no longer active.
Rendzina	(Great Soil Groups classification) Shallow to very shallow soils formed from limestones and marls. Usually they are black, very dark brown or dark grey clay loams or light clays of strong, very fine crumb to granular structure and loose, soft consistency which usually continues throughout their thin sola.
residential development	A level of urban development which provides for the construction of roads, drainage and services to cater for subdivision allotments for housing, typically 400 – 5,000 m^2.
residual	*In situ* processes of weathering, leaching and new mineral formation are dominant. Lateral surface movement is minimal. A residual site may occur either on low gradient topography, such as a plateau surface, or where soil material is of such a nature as to resist lateral movement despite a considerable slope gradient (Paton 1978).
Residual Soil Landscape	(Soil Landscape terminology) Soil landscapes dominated by sites where deep soils have formed from *in situ* weathering of parent materials. Residual soil landscapes typically have level to undulating elevated landforms. Landform elements include some summit surfaces, plateaux, terrace plains, peneplains and old ground surfaces. Stream channels are usually poorly defined
retaining wall	A barrier, usually of uniform thickness and constructed or masonry materials designed and installed to hold back unconsolidated rock and/or soil. Its aim is to counter the gravitational force of the material it is retaining and prevent mass movement. Small holes or gaps (weepholes) may be incorporated in the wall to cater for seepage of water.
reticulate horizon	Intended for strongly-developed reddish, yellowish and greyish or white, generally reticulately-mottled horizons that can be hand-augured

	or cut with a spade. Ferruginous nodules or concretions may be present.
rhyodacite	Fine-grained equivalent of granodiorite.
rhyolite	Fine-grained porphrytic acidic extrusive igneous rock; exhibits flow texture; consists of quartz and feldspar in a glassy to cryptocrystalline groundmass.
rich fen peats	Soils in which the profile is dominated by peat/organic matter resting on silts to gravels.
ridgeslope	Slope along a ridge line.
rill, rill erosion	Removal of soil from the land surface by the formation of numerous small channels <0.3 m deep. It typically occurs on recently cultivated or disturbed soil. Sheet erosion grades into rill erosion or, where very severe, into gully erosion. It is very difficult to assess rill erosion unless the site is observed immediately after the erosion event as the rills are eventually lost due to revegetation or cultivation and the evidence indicates a sheet process. Indicators include rill frequency and depth, lack of topsoil layer and exposure of subsoils or roots. Local knowledge of an area is necessary for correct interpretation.
ring dyke	An igneous intrusion in which the individual members appear as circular or part-circular outcrops. Ring dykes are usually taken to indicate subsidence of the central block, e.g., a volcanic plug.
ripe	Describes wet sedimentary material that has dried out, supports roots and has developed some structure and firm consistency.
ripeness	Describes the stages of the drying of wet sediments to soil. See also ripe; unripe.
rises	A landform pattern comprising very gentle to steep slopes with very low relief. The fixed erosional stream channels are closely to very widely spaced and form a non-directional to convergent, integrated or interrupted tributary pattern. The pattern is eroded by continuously active to barely active creep and sheet flow. Typical elements are hillcrest, hillslope (dominant), footslope and drainage depression. Includes valley flat, stream channel, gully, tor and fan. See also mountains; hills; low hills; plain.
river capture	The action of a river in acquiring the headstreams of a second river by enlarging its drainage area at the expense of the other.
road subgrade rating	(Soil Landscape terminology) The capability of the soil material as either in situ or consolidated imported material for use as road subgrade. Road subgrade should be readily excavated, graded and compacted and be sufficiently strong to support traffic loads. Road subgrade is usually overlain by road base and then covered by a water shedding surface pavement.
roadside erosion	Soil erosion associated with the presence of a road across a landscape. Such may be directly caused by the road, or may be

	existing erosion aggravated by the location, nature and construction of the road.
rock flat	A flat of bare consolidated rock usually eroded by sheetwash.
rock platform	A flat of consolidated rock eroded by waves.
rockfall hazard	(Soil Landscape hazard) Areas immediately below cliffs and unstable scarps are at risk of serious damage from rockfalls and other mass movement of debris. The presence of a rockfall hazard is assessed by proximity to cliffs, scarps and other potentially unstable hillslopes as well as the presence of unconsolidated scree and talus materials.
rock outcrop	(Soil Landscape terminology) Rock outcrop restricts excavation and the installation of underground services. Garden establishment is often difficult where there is rock outcrop
root ball	Soil profile and substrate encompassed by the roots of a tree which has fallen over, due to natural or human causes.
rough-ped fabric	Peds are evident. Characteristically >50% of the peds are matt or rough-faced.
Rudosol	(Australian Soil Classification) Soils with negligible pedologic organisation. They are usually young soils in the sense that the soil forming factors have had little time to pedologically modify parent rocks or sediments. The component soils can vary widely in terms of texture and depth. Many are stratified and some are highly saline.
runoff	Surface water running off the soil surface. The quantity of runoff flowing off a site is largely determined by slope, surface cover and soil infiltration rate.
run-on	Surface water flowing onto an area due to rainfall and runoff occurring higher up a slope. Often occurs in an urban context as a contributing factor to increased erosion hazard. Also used in semi-arid areas to refer to surface water which is diverted from sloping country onto flatter land to achieve increased production from such land. Areas with high run-on are often prone to temporary localised flooding. Run-on is ranked as: • low— small volumes of overland flow occur • moderate— significant overland flow occurs • high— concentrated large volumes of overland flow occur.
rural capability	(Soil Landscape terminology) The ability of an area of land to sustain permanent agricultural or pastoral production without permanent damage. Land that is used beyond its rural capability will deteriorate rapidly, resulting in loss of production and a permanent loss of soil resources (Emery 1985). General rural land capability classifications are provided for those soil landscapes where most of the land has not been urbanised or reserved as a National Park or nature reserve. Rural land capability has been ranked by the severity of the limitations that are likely to affect regular cultivation and grazing practices. Three degrees of

	severity of limitations are used for regular cultivation and for grazing. They are low, moderate, and high (to severe). *Cropping* • Low limitations for regular cropping— a stable and productive land surface can be maintained in cropping systems (including minimum or no-till farming practices, stubble retention and rotational cropping) where consideration is given to maintaining and improving soil structure and nutrient status. Besides strip cropping in some circumstances, no other special soil conservation practices are necessary. • Moderate limitations for regular cropping— soil conservation measures such as graded banks, waterways, diversion banks and contour cultivation are required to maintain surface stability and productivity. Further, cropping systems should incorporate minimum or no-till farming practices that include stubble retention and rotational cropping, with attention paid to soil structure and nutrient status. • High to severe limitations for regular cropping— due to the severity of limitations present, land is not suitable for cropping and should be avoided. *Grazing* • Low limitations for grazing— simple soil conservation practices such as pasture improvement, grazing pressure control, vermin control, application of seed, fertilisers and contour chisel ploughing are necessary to maintain a stable land surface. • Moderate limitations for grazing— soil conservation measures such as graded banks, diversion banks, gully control structures as well as pasture improvement, controlled grazing pressure, vermin control, application of seed and fertiliser and contour chisel ploughing may be needed to maintain a stable land surface. • High to severe limitations for grazing— land is generally best suited for green timber. Livestock should be excluded.
Rural Capability Classification	A method of land classification which ranks land by its ability to sustain various intensities of rural land use.
Rural Land Capability, RLC	An eight-class system used by the Soil Conservation Service of New South Wales for evaluating rural land. It is based on an assessment of the biophysical characteristics of the land, the extent to which these will limit a certain land use, and the current technology that is available for the management of land. The classification also incorporates an assessment of the soil erosion hazards, with emphasis on a `safe' level of land use, thus avoiding environmental problems caused by soil erosion and sedimentation. The capability classes categorise the land in terms of its general limitations. Specific numerical values for individual limitations such as climate, slope gradient, landform types, adverse soil conditions, rock outcrop, drainage and inundation and productivity of crops etc. are not given. Instead, the classification outlines the types of land uses appropriate for a certain area of land and the types of land

	management practices needed to prevent soil erosion and maintain the productivity of the land.
rural residential development	A level of rural development which enables the construction of roads, drainage and services to cater for subdivision allotments typically 2 – 10 ha in size.
rural residential land	Primarily residential land often associated with hobby farming. Allotments are generally 1 – 15 ha in size.

S

saline discharge	Underground saline water which flows or seeps out at the soil surface. Salinity can be concentrated by subsequent evaporation.
saline scalds	The removal of topsoil which exposes a subsoil naturally high in salts.
saline soil	A soil which contains sufficient soluble salts to adversely affect plant growth and/or land use. Generally, a level of electrical conductivity of a saturaltion extract >4 mS/cm at 25^{o} C is regarded as the defining characteristics of a saline soil.
salinity	(Soil Landscape terminology) The concentration of soluble salts in water and soil assessed by measurement of electrical conductivity. Excessive salt is toxic to most plants. Saline surface soils are usually bare or have sparse plant cover. These soils have a high erosion hazard and are often poorly drained. Treatment of saline soils often involves removal of saline water by drainage and deep ripping as well as establishment of salt-tolerant plant species. Cover crops, mulches and large applications of nitrogenous fertilisers, as well as gypsum, are often required for successful establishment of vegetation. To further reduce concentrations of salts within the root zone of plants, measures such as tree or lucerne planting in recharge areas may be required to ensure long-term rehabilitation. Saline soils may be corrosive to untreated underground services.
salinity, dryland or irrigated	(Soil Landscape terminology) Excessive salt is toxic to most plants. Saline surface soils are usually bare or have sparse plant cover. These soils have a high erosion hazard and are often poorly drained. Treatment of saline soils often involves removal of saline water by drainage and deep ripping as well as establishment of salt-tolerant species. Cover crops and mulches, as well as the application of fertilisers and gypsum, are often required for successful vegetation establishment. Strategic measures that further reduce the concentration of salts within the plant root zone (such as reduction of fallow ground and the planting of trees or other deep-rooted perennials in recharge areas) should be planned to ensure long-term rehabilitation. Saline soils may be corrosive to untreated underground services. Saline sites have soils with electrical conductivities >4 dS/m in the root zone.

saltmarsh	A grassland or herbland occasionally inundated by sea water and hence having salt tolerant plant species.
sandplain	Level to gently undulating plain of extremely low relief and without channels. Formed possibly by sheet flow or streamflow but now relict and modified by wind action.
sandy fabric	A soil material consisting of closely-packed sand grains which are weakly cohesive with few, if any, peds.
sapric peat	Strongly to completely decomposed organic material.
saprolite	Form of decomposed rock characterised by the preservation of structures that were present in the unweathered rock.
saturated hydraulic conductivity, K_{sat}	(Soil Landscape terminology) Hydraulic conductivity is the quantity of pure water flowing through soil per unit of energy gradient with time. It may be taken as the percolation rate when infiltration and drainage in a saturated soil are equal. It is measured as water depth per unit time. Hydraulic conductivity is an important but often highly variable soil property. It depends on the management history of the soil. Estimates are provided as an indication of broad classes of saturated hydraulic conductivity modified from Craze and Hamilton (1991); and Hazelton and Murphy (1992). Precision is low. Estimates are made by field texture, clay fraction and soil structure grade derived from profile field descriptions (Macdonald *et al*. 1990; Abraham and Abraham 1992) along with non-dispersed particle size analysis, dispersion, sodicity and salinity laboratory test results. Results can be used as input for basic soil water balance models as well as for coarse hydraulic modelling of catchments.
scald	Two definitions: a. A flat with no vegetation from which soil has been eroded or excavated by surface wash or wind, or b. a bare surface caused by salting. See also saline scald; seepage scald.
scarp/cliff	Steep slope terminating a plateau or a level upland surface.
schist	A medium to coarse-grained higher-grade regionally metamorphosed rock exhibiting pronounced foliation due to reorientation of platy minerals such as micas.
sclerophyll	Denoting the presence of hard stiff leaves, generally indicating an adaptation to drier conditions.
scoriaceous	A term used to describe a lava or volcanic rock containing cavities (vesicles) caused originally by bubbles of volcanic gases.
scree	Sheet of any loose, fragmental material, lying on or mantling a slope. Whilst some consider this to be synonymous with talus, others use this term more specifically to refer to a generally unconsolidated mantle of

	loose rocky fragments covering a pre-existing landform, and thereby its shape and angle is influenced by that underlying landform. See also talus.
screen	Remnant of country rocks which separates different granitic plutons. Screens can range from kilometres wide to only a few metres wide.
scroll	Long, curved, very low ridge built up by channelled streamflow and left relict by channel migration; part of a meander plain.
scrub	Vegetation structure consisting of shrubs 2 – 8 m tall.
seasonal cracking	Refers to those shrinking clay soils which, during a dry period, develop cracks ≥5 mm wide and which penetrate >0.3 m into the soil material (Northcote 1979). However, if the surface soil is massive, all such cracks may not be evident at the surface. As a minimum, the frequency of cracking should be of the order of one crack per m^2.
seasonal waterlogging	(Soil Landscape terminology) Seasonally high water tables result in similar problems to permanently waterlogged soils. Soils in landscapes with this limitation can become extremely dry for long periods.
sedimentation	Deposition of sediment. The typical use for the term infers deposition by water. In a soil conservation context, sedimentation is an end-point in the erosion process with transported soil material being deposited in locations such as in a channel, along a fence line, on an area of low slope or a gully, creek, river, sediment trap or dam.
sediments, sedimentary rocks	Rocks which result from the consolidation of sediment derived from the wastage of pre-existing rocks and/or from organic accumulations and chemical precipitates; distinguished from loose sediments by the degree of lithification.
seepage scalds	Bare areas of soil where rising watertables and the accumulation of salts and/or sodium at the soil surface have killed vegetation, resulting in subsequent removal of topsoil by erosion (see salinity and potential and known discharge areas).
self-mulching	Loose surface mulch of very small peds which form when soil dries out.
semi-arid	Climate with 250 – 500 mm annual rainfall.
Septic absorption potential	(Soil Landscape terminology) This assumes site conditions are favourable and is a ranking of the soil in the base and lower sides of the absorption trench. Rankings are based on the long-term soil effluent acceptance rate being 10–20mm/d. Alternative disposal methods such as spray irrigation may be feasible if septic absorption potential is very low. Soils in the sides and base of absorption trenches that have a very low (VL) potential for septic absorption have one or more of the following characteristics: • Exchangeable sodium is >6% or dispersion is >50%. Sodic soils are rendered impermeable due to high sodium absorption ratios of

	domestic wastewaters (Patterson 2001). Saturated hydraulic conductivity of sodic soils can be expected to drop below the long-term acceptance rate. • Saturated hydraulic conductivity is <50 mm/d or >1,400 mm/d (AS 1547 2000). • Limited ability to absorb nutrients, i.e. phosphorus sorption is less than 125 mg/kg, cation exchange capacity is <6 me/100 g, or base saturation is >80%. • Rock volume is >50%. Rocky soils are generally expensive to excavate (United States Department of Agriculture 1983). Soil materials that do not have the above properties are rated using the USCS classification ranking of Finlayson (1982). Where borderline USCS ratings are given, the first ranking is used.
sesquioxide	Oxides of aluminium and iron.
shale	A fine-grained detrital sedimentary rock which is laminated and easily split into layers.
shallow soils	(Soil Landscape terminology) Shallow soils are <50 cm deep. Shallow soils restrict plant growth and increase the difficulty of installing underground services. Soil depth is measured from the current soil surface to weathered parent material, or bedrock, or the top of any hardpan layers that would not be considered as soil for plant growth or construction.
sharp boundary	Boundary <5 mm wide.
shear strength rating	(Soil Landscape terminology) Shear strength assessments are based on relative shear strength of USCS groups (Finlayson 1982). Shear strength is a factor in the assessment of slope instability.
sheet erosion	The removal of the upper layers of soil by raindrop splash and/or runoff, with no perceptible channels being formed.
sheet erosion risk	(Soil Landscape terminology) The long-term susceptibility of a parcel of land to sheet erosion if the soil is left exposed and no erosion control management is employed. The factors that contribute to sheet erosion risk include rainfall erosivity, soil erodibility and slope gradient.
sheet-flood fan	Level to very gently inclined landform pattern with extremely low relief and numerous, rapidly migrating, very shallow, incipient stream channels forming a divergent to unidirectional, integrated or interrupted reticulated pattern. Aggraded by frequently active sheet flow and channelled stream flow with subordinate wind erosion. Typical elements are plain and stream bed. See also alluvial fan; pediment.
shield volcano	Broad, gently sloping surface consisting of overlapping basalt flows.
shrink-swell potential	(Soil Landscape terminology) Expansive soil materials shrink and swell with changes in moisture content. Such soil materials have volume expansions >30% or linear shrinkages <17%, and characteristics such as slickensides, seasonal cracking and high plasticity. When the moisture content of the soil changes, shrink-swell soils can damage

	structures such as buildings, roads, dams, walls and underground services that are not appropriately designed. The shrink-swell potential of most soils can be reduced by compaction, addition of lime or gypsum, or burial beneath a stable material. Soil movement can be eliminated by keeping soil moisture levels constant. Categories used are: • Low— linear shrinkage of 0 – 12% • Moderate— linear shrinkage of 12 – 17% • High— linear shrinkage of 17 – 22% • Very high— linear shrinkage of >22%.
shrink-swell soil	A soil which reacts to a change in water content with a change in soil volume, swelling with increasing moisture content and shrinking as it dries out.
silcrete	Strongly indurated siliceous material cemented by and largely composed of forms of silica including quartz, chalcedony, opal and chert.
siliceous	Having a high proportion of quartz. Usually a descriptor for sands or silica-rich precipitates.
Siliceous Sand	(Great Soil Groups classification) Deep profile of sands to clayey sands with no horizon differentiation except for a darker A_1.
sill	A sheet of horizontal or near horizontal igneous rock intruded into layers of sedimentary rock. The horizontal extent is always greater than the thickness.
sillimante	An aluminium silicate mineral indicative of higher grade metamorphism.
silt	Material within the particle size range of 0.002 – 0.02 mm. Non-plastic when moist and not deposited by floods. See also alluvium.
siltstone	Fine-grained detrital sedimentary rock composed mainly of silt or clay respectively; will not easily split into layers.
silty bog soils	Brownish-black organo-mineral surface soils with well-developed structure becoming paler and less organic with depth. The watertable is present for at least part of the year.
Silurian period	Geological period 440 – 395 million years ago.
single-grained	The soil occurs as a loose, incoherent mass of individual particles (e.g., unconsolidated sands).
sink hole/dioline	Steep-sided closed depression, eroded by solution, directed towards an underground drainage way, or by collapse consequent on such solution; typical of karst terrain.
skeletal soils	Thin soils which present a barren, inhospitable surface to vegetation.

slaking	The partial breakdown of soil aggregates in water due to the swelling of clay and the expulsion of air from pore spaces.
slate	Fine-grained regionally metamorphosed argillaceous rock which has a well-developed planar cleavage (slaty cleavage) and splits readily into thin plates.
slope	An incline, upward or downward, from the horizontal. Its angle is measured in degrees or as the ratio of the difference in elevation to the horizontal distance between two points, expressed as a percentage.
slump	A slide where the material in motion is not greatly deformed but has a backward rotation on a generally horizontal axis, i.e. displacement along a concave surface of separation.
smooth-ped fabric	Peds are evident. Characteristically >50% of the peds are glossy or smooth-faced.
snuffy	A term coined by Parbery (1939) to describe the massive, powdery nature of loamy topsoils of Krasnozems that have undergone severe structural decline due to over-cultivation.
soapy	Soft malleable greasy feel of deep subsoils from soils formed on granodiorites.
sodic soils	(Soil Landscape terminology) Sodic soils have an Exchangeable Sodium Percentage (ESP) >6%. They have low stability when wet, and they set hard when dry, reducing permeability and available water capacity and forming surface crusts that restrict plant establishment and growth. Diagnostically, they typically exhibit high bulk density and strength, a strong coarse blocky or columnar structure, and are both highly erodible and dispersible. However, their degree of dispersion in the field depends on several other factors such as salinity, pH, clay content, mineralogy and organic matter. Not all sodic soils are dispersible, nor are all dispersible soils sodic.
sodicity	A measure of exchangeable sodium in the soil. High levels adversely affect soil stability, plant growth and/or land use.
Sodosol	(Australian Soil Classification Soil Order) Soils with strong texture contrast between A horizons and sodic B horizons which are not strongly acid.
softwood plantation	Land where the vegetation has been cleared and replaced with a plantation of softwood species, e.g., *Pinus radiata.*
soil	(Soil Landscape terminology) A natural body consisting of layers or horizons of mineral and/or organic constituents, of variable thickness, that differs from its parent material in morphological, physical, chemical and mineralogical properties and biological characteristics (Birkeland 1984).
SoilWorks classification	(Soil Landscape terminology) Soil conservation earthworks are earthen structures designed and constructed to minimise soil erosion by

intercepting and/or diverting run-off. The main earthworks are dams for water retention, gully control structures for restricting erosion in gullies and banks for diverting water flow.

The SoilWorks classification is adapted from Table 20.8 of Crouch *et al*. (1991). This table forms the basis for determining recommendations for construction of small farm dams. These dams usually have <5,000 m^3 of water storage capacity and a top water level <3 m above the original ground surface on the upstream side of the wall. Ratings apply only for well-graded soils and to situations where the consequence of failure involves only loss of stored water and no other damage. USCS, particle size analysis, dispersion and volume expansion results are used to derive the recommendations. Linear shrinkage test results are used if available.

A Suitable for normal use. Take care to achieve good compaction, preferably with moist soil. If the soil is dry (cannot be moulded), reduce layer thickness to <15 cm. Minimum batter grades 1:2.5 upstream, 1:2 downstream, except for CH and MH classifications, when they should be decreased to 1:3 and 1:2.5, respectively.

B Stable and impervious when well-compacted (≥85% of Proctor maximum dry density). To achieve this, the soil should be close to the optimum moisture content for the compaction plant, be placed in layers <15 cm thick and compacted with four complete passes of a crawler tractor or roller. For crawler tractors, the soil should be sufficiently moist to be made into a thread 10 mm thick, but not moist enough to be rolled thinner than 3 mm without breaking. Minimum batter grades are 1:3 upstream, and 1:2.5 downstream.

C Aggregated material that may not hold water. Compact with at least four passes of a sheepsfoot roller when the soil is slightly wetter than the optimum moisture content for compaction (when it can be rolled into a 3-millimetre diameter thread). Use a vibrating roller for dry soils. An ameliorant—STPP or sodium carbonate—is probably required. If the EAT is Class 6 or the dispersion percentage is less than 6, then the dam is likely to leak unless it is sealed with better clay or treated with an ameliorant to induce dispersion.

D Highly susceptible to tunnelling or piping failure. It must be well compacted throughout to reduce permeability and saturation settlement. If the soil is drier than is optimum, gypsum or hydrated lime should be used at 1 tonne per 750 m of wall to reduce dispersion. The soil should be compacted to at least 85% of Proctor maximum dry density by ensuring the correct moisture content (see the technique recommended under ‘B: Suitable for normal use’), placing in layers <15 cm thick and rolling with at least four complete passes of the plant. For additional stability, the structure should be designed to hold no >1 m of water against the wall and batter grades should be decreased to 1:3.5 upstream and 1.3 downstream.

E Very susceptible to tunnelling or piping failure. In addition to recommendation D, the structure must hold <1 m depth above the original ground surface at the upstream side of the wall and

	not be subject to >0.3 m/d drawdown (trickle pipes must not be >0.3 m below the top water level). Gypsum or hydrated lime at 1 t/750 m^3 of wall should be incorporated in the upstream side of the wall. The upstream batter grades should be decreased to 1:4. F Very susceptible to tunnelling or piping failure. Due to the high shrink-swell potential, batter grades must be decreased. In addition to recommendation D, freeboard must be increased to >1 m above surcharge level and hydrated lime or gypsum should be applied at rates determined in the laboratory. Batter grades should be decreased to 1:4 upstream and 1:3 downstream. G The high shrink-swell potential of this soil can result in cracks extending through the wall below the top water level. To reduce this possibility, a compact central core (≥85% Proctor maximum compaction) must be obtained by constructing when the soil is sufficiently moist to be rolled into a 10 millimetres diameter thread, but not moist enough to roll to 3 mm without breaking. The freeboard must be increased to >1 m above surcharge to prevent surface cracks extending below the waterline. Recommended batter grades are 1:3.5 upstream and 1:3 downstream. The structure must be designed to retain sufficient water to keep the wall moist and minimise cracking. H Not recommended for use, unless all the following precautions are implemented. The central core must be well compacted, preferably with a vibrating sheepsfoot roller, to obtain a density of ≥85% Proctor maximum as determined in the laboratory. The settled freeboard must be increased to >1 m above surcharge level, and batter grades should be to at least 1:4 upstream and 1:3 downstream. I Pervious soil. This soil is not recommended for general use in soil conservation earthworks, but may be used in a zoned embankment or sealed with bentonite or a plastic liner. Recommended batter grades are 1:3 upstream and 1:3 downstream. J Not recommended for use. K Usually unsuitable for construction. When two USCS symbols have been given for borderline classifications, two differing recommendations may be given. In these cases, the more conservative recommendation should be used.
soil colour	The colour of soil material as determined by comparison with a standard Munsell soil colour chart (Munsell ###
soil creep	A generally imperceptible slow downward transportation of soil under the influence of various erosive agents.
soil depth	The depth of the soil from surface to bedrock.
soil fire hazard	(Soil Landscape terminology) Highly organic soils, such as peats or litter build-up, can be ignited by vegetation fires during drought. They

	may smoulder for months and are very difficult to control. Peat fires lower ground levels, sterilise the soil and in some instances, leave the ground bare for subsequent erosion.
soil horizon	A layer of soil approximately parallel to the land surface with morphological properties different from layers below and/or above the layer. See also A horizon; B horizon; C horizon; D horizon.
Soil Landscape	(Soil Landscape terminology) An area of land with recognisable and specifiable topography and soils, capable of representation on maps, and that can be described using concise statements. Landscapes can be used to distinguish mappable areas of soils because similar causal factors are involved in the formation of both landscapes and soils. Similarly, constraints to rural and urban development of land are related to both landscape and soil qualities. The soil landscape concept permits the integration of both soil and landform constraints into a single mapping unit. Each soil landscape is given a name based on the locality where a typical example occurs and an alphabetic code (two letters for soil landscapes products, three letters for soil and land resources products).
Soil Landscape Variant	(Soil landscape terminology) Very like their parent soil landscapes, usually varying in only a few physical features. They are either not sufficiently different or of insufficient areal extent to be soil landscapes in themselves. They are identified by an additional letter after the parent soil landscape code.
Soil Material	(Soil Landscape terminology) A three-dimensional soil entity which has a degree of homogeneity and lateral continuity. Each soil material is defined and described in terms of its readily recognised and characteristic morphological properties and geographic abundance. The definitive attributes may vary from one soil material to another, depending on what is recognisably characteristic of the materials. In most cases, each soil material has a consistent set of properties and qualities, because soil materials are not necessarily defined by soil formation processes or position within a soil profile. Introduced fill, regolith or unconsolidated alluvium may be included; however, soil materials usually correspond with soil horizons. Each soil material has a unique code consisting of the soil landscape code and a unique number.
soil reaction trend	The change in pH with depth in a soil profile, from surface soil to deep subsoil. Four such trends have been defined: strongly acid, acid, neutral and alkaline. (Northcote 1979)
soil structure	Refers to the distinctness, size, shape and condition of natural, or artificially produced soil aggregates (peds). The degree of structural distinctness is referred to as grade of pedality. See also single-grained; massive; weak pedality; moderate pedality; strong pedality.
sola	The upper part of the soil profile, i.e., A and B horizons.
Solodic Soil	See Solodised Solonetz and Solodic Soil.

Solodised Solonetz and Solodic Soil	(Great Soil Groups classification) Soils with strong texture contrast, well-developed bleached A_2 horizon over an alkaline medium to coarse angular blocky structure of typically strong consistency.
Solonchak	(Great Soil Groups classification) Soils dominated by salt accumulation and which show one or more of the following characteristics: salty encrustations, surface flaking, polygonal cracking of the surface, powdery structure and lack of normal plant growth except for salt-tolerant species.
Solonetz Soil	(Great Soil Groups classification) Soils with prominent texture differentiation between neutral to slightly alkaline, loamy topsoils and strongly alkaline, clay subsoils.
Solonised Brown Soil	(Great Soil Groups classification) Soils characterised by large amounts of calcareous material in the profile both in the fine earth fraction and as soft and hard segregations consisting of calcium and magnesium carbonates, but usually the calcium is dominant.
Soloth	(Great Soil Groups classification) Acid soils with strong texture contrast between pale topsoil and clay subsoil with coarse blocky or columnar structure.
solum	The upper part of a soil profile above the parent material in which current processes of soil formation are active. This is where the living roots and other plant and animal life characteristics are exhibited.
species	Group of organisms potentially capable of breeding to produce viable offspring; taxonomic unit of classification.
splay	A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (often coarse-grained) on the floodplain.
sporadic occurrence	Relates to a soil or landscape hazard or quality which occurs occasionally in a random manner across a landscape. It is not related to soils, underlying geology or a landform element.
stagnant alluvial plain	An alluvial plain where erosion and aggradation by channelled and overbank streamflow are barely active or inactive because of reduced water supply, without apparent incision or channel enlargement that would lower the level of stream action. Typical elements are stream channel and plain (dominant). Includes bar, scroll, levee, backplain, swamp, ox-bow, flood-out and lake. See also floodplain; terrace.
Stagnant Alluvial Soil Landscape	(Soil Landscape terminology) Occur as alluvial plains where erosion and aggregation by channel and over-bank flow is barely active because of reduced water flow and stream migration. Typical landform elements are usually subdued and often inactive. They include plains, some higher terraces, prior streams, back plains and swamps.
steep slopes	(Soil Landscape terminology) Several landscape hazards increase with slope. Soil erosion is more severe, rock outcrop is more common, soils are generally shallower and mass movement is more likely with

	increasing slope; therefore, slope is an important attribute that can limit many land uses and an important controlling factor for both urban and rural capability. Steep slopes are defined as being >33% (18°).
stone lags	Residual accumulation of stones from which finer material has been removed.
stone line	A layer of gravel within a soil profile.
stoniness	(Soil Landscape terminology) Gravels, stones and rocks increase the cost and difficulty of excavation for underground services and increase the difficulty of cultivation. Gravels, stones and rocks occupy soil volume, reducing plant exploitable moisture and nutrients. Surface stones can have mixed effects on water infiltration, soil erodibility and moisture loss through evaporation. Soils that contain more than 20 – 50% coarse fragments are stony.
STPP	Sodium tripolyphosphate. A manufactured chemical used for the dispersion of aggregated soils such as in the sealing of leaking dams.
stream channel	Linear, generally sinuous, open depression, in parts eroded, excavated and aggraded by channelled streamflow. Includes streambed, banks and bars.
streambank	Very short but laterally extensive slope, moderately inclined to precipitous, forming the margin of a stream channel and resulting from erosion or aggradation by channelled stream flow; part of a stream channel.
streambank erosion	The removal of soil from a streambank, typically during periods of high streamflow.
streambed	Linear, generally sinuous, open depression forming the bottom of a stream channel eroded and locally excavated, aggraded or built up by channelled streamflow; parts that are built up include bars; part of a stream channel.
strike	Direction taken by a structural surface such as a fault or bedding plane as it intersects the horizontal.
strong pedality	The soil contains peds that are clearly observed.
strongly coherent B horizon	B horizons in which the consistence strength ranges from very firm to strong throughout, or they contain sub-horizons with these properties. Included are pan-like materials that have been variously described as orstein, coffee rock or Sandrock.
structural decline hazard, structural degradation hazard6	(Soil Landscape terminology) Through inappropriate management techniques such as overgrazing and/or excessive cultivation when too wet or dry, soils may become structurally degraded over time. Structural decline usually involves at least one of the following: • increased soil bulk density • increased strength and cloudiness • decreased soil organic matter content

	• decreased soil porosity • formation of hardpans or hardsetting layers at or near the soil surface. Comparisons between the different land uses of sites, most notably between native or pristine areas and disturbed or developed areas, can often vividly demonstrate soil structural decline. Management strategies to overcome structural decline include: • use of mulches • appropriate crop and pasture rotation • minimum or no-tillage practices • herbicide control of weeds • more appropriate stocking rates.
structured clays	Soils of uniform texture (i.e. clays) that cannot be classified by the Great Soil Group (GSG). These soils have moderate to strong structure, are deep and are generally dark They are associated with soils such as Black Earths, and Brown and Grey Clays.
structured loams	Generally shallow soils with a distinct pedality, minimal horizon differentiation and a mainly loamy texture.
Structured Red Earth	Pedal reddish (5 YR Value/Chroma 5) loamy to clay loam soils with gradual increase in clay content with depth over a gradual to diffuse boundary.
Structured Yellow Earth	These are soils like Yellow Earths except that the subsoils' structure may be pedal rather than earthy. The Structured Yellow Earths are intergrades between Yellow Earths and Yellow Podzolics.
sub-angular blocky	Like angular blocky except peds are bounded by flat and rounded faces with limited accommodation to the faces of surrounding peds. Many vertices are rounded.
subdominant peds	Form when dominant peds either pack together to form large compound entities or break into smaller units. Subdominant peds are less conspicuous than dominant peds.
sub-humid	Climate with 500 – 1,500 mm annual rainfall.
subplastic	A soil which appears to become more clayey (i.e., harder to work) with prolonged kneading. It is usually red, well-structured and well-drained.
subsoil	Subsurface soil material comprising the B horizons of soils with distinct profiles. In soils with weak profile development, the subsoil can be defined as the soil below the topsoil.
subspecies	A grouping within a species (i.e. subgroup) used to describe variants of that species.
sulfidic materials	Subsoil, waterlogged, mineral or organic materials that contain oxidisable sulfur compounds, usually iron disulfide (e.g., pyrite, FeS_2) that has a field pH >4.0 but which will become extremely acid when drained.

sulfuric materials	Soil materials that have a field pH <4.0 when measured in dry season conditions because of the oxidation of sulfidic materials.
summit surface	Very wide, level to gently inclined crest with abrupt margins, commonly eroded by water-aided mass movement or sheetwash.
supratidal flat	Large flat subject to infrequent inundation by water that is usually salty or brackish; aggraded by tides.
surface condition	Describes the actual surface condition of the exposed soil surface. Options include gravelly; hardsetting; loose; friable; self-mulching; seasonal cracking; crusting; and recently cultivated.
surface movement potential	The degree to which the soil rises and falls with changes in moisture.
swale	Linear, level-floored depression excavated by wind, or a relict feature between ridges built up by wind or waves, or built up to a lesser height than them; or a long curved relict open or closed depression between scrolls built up by channelled streamflow.
swamp	Almost level, closed or almost closed depression with a seasonal or permanent watertable at or above the surface, commonly aggraded by overbank streamflow and sometimes biological accumulation.
swamp complex	Mixed growth forms: low shrubs, heath, swamp grasses, sedges, rushes and forbs.
swamp hummock	Steep-sided hummocks rising above a flat swamp surface.
Swamp Soil Landscape	(Soil Landscape terminology) Soil landscapes dominated by ground surfaces and soils that are at least seasonally wet. Soil parent material includes large amounts of accumulated decayed organic matter. Water tables are frequently close to the surface. Landform elements may include swamps and some relic oxbows, abandoned channels, lagoons and swales.
swash zone	The area affected by the rush of seawater up beach following the breaking of waves.
syenite	Coarse-intermediate plutonic igneous rock; the intrusive equivalent of trachyte; usually contains orthoclase, microdine or perthite, a small amount of plagioclase, hornblende and other mafic minerals but little or no quartz.
syncline	Fold in rock strata that is bowed downwards with the youngest rocks in the centre of the fold.

T

tachylite	Volcanic glass of basaltic composition.

tall open-forest	Vegetation structure consisting of trees ≥30 m with a canopy cover 30 – 70%.
tall shrubland	Canopy cover <70% and maximum height >2 m.
talus	Moderately inclined to steeply waning lower slope, aggraded by gravity, usually formed from an accumulation of rock fragments and other soil material at the foot of a cliff or steep slope. May be distinguished from scree in that a talus slope may contain both rocks and soil and derives its shape from its own characteristics rather than the underlying landform. See scree.
tenic B horizon	Usually a weakly developed B horizon of texture and/or colour and/or structure and/or presence of segregations of pedogenic origin (including carbonate).
Tenosol	(Australian Soil Classification) Soils with generally only weak pedologic organisation apart from the A horizons.
Terra Rossa Soil	(Great Soil Groups classification) Mainly red soils formed on limestone or highly calcareous parent materials.
terrace	A former floodplain on which erosion and aggradation by channelled and overbank streamflow are either barely active or inactive because deepening or enlargement of the stream channel has lowered the level of flooding. Typical elements are plain (dominant), scarp and channel bench. Includes stream channel, scroll and levee.
terracettes	Small terraces on sideslopes resulting from soil creep and/or trampling by hoofed animals.
Tertiary period	Period of geological time 2 – 65 million years before present.
texture	A measure of the behaviour of a small handful of soil when moistened and kneaded into a ball and then pressed out between the thumb and forefinger. It is generally related to the proportion of soil particles of different sizes (sand, silt, clay and gravel) in a soil, but is also influenced by organic matter content, clay type and degree of structural development of the soil.
thalweg	A line connecting the points of deepest flow in successive downstream channel cross section, i.e., the planform pattern of maximum channel depth.
thixotrophic	The term applied to soil/liquid systems which are solid when stationary but which become liquid and mobile when affected by shearing stresses. Usually refers to thixotrophic clay which is a sodic clay gel formed when highly sodic clays are saturated.
tidal creek	Intermittently water-filled open depression in parts eroded, excavated and aggraded by channelled tide water flow; type of stream channel characterised by a rapid increase in width downstream.

tidal flat	Level landform pattern with extremely low relief and slowly migrating deep alluvial stream channels which form non-directional integrated tributary patterns. Aggraded by frequently active tides. Typical elements are plain (dominant) and stream channel. Includes lagoon, dune, beach ridge and beach.
tillite	Coarse conglomeratic rocks with angular fragments. They are consolidated from the till deposited from a melting glacier.
tilth	A general term used to describe the physical condition of a soil as related to its ease of tillage and fitness as a seedbed. A soil in good tilth will not impede seedling emergence and root penetration.
timber/scrub/unused forest land	Unlogged state and private forests and partially cleared land which are not grazed or areas being allowed to regenerate. Does not include land which is currently being used for agricultural, pastoral or forestry production.
tonalite	A quartz-diorite igneous rock intermediate in quartz content between a diorite and a granodiorite.
topography	The shape of the ground surface as depicted by the presence of hills, mountains or plains. Steep topography is characterised by steep slopes and hilly land. Flat topography is characterised by flat land with minor undulations and gentle slopes.
toposequence	Repetitive sequence of soils encountered between hillcrests and the valley floor. A catena is a special case of a toposequence in which the parent material is uniform.
topsoil	Part of the soil profile, typically the A_1 horizon, containing material which is usually darker, more fertile and better structured than the underlying layers.
tor	Steep to precipitous hillock, typically convex, with a surface mainly of bare rock, either coherent or comprising subangular to rounded large boulders (exhumed core-stones, also themselves called tors) separated by open fissures; eroded by sheet wash or water-aided mass movement.
torbanite	A type of coal usually formed from algal and fungal matter.
toscanite	Igneous rock composed of phenocrysts of quartz, orthoclase, plagioclase and often biotite in a grey groundmass.
trachyandesite	A volcanic rock intermediate in character between a trachyte and an andesite.
trachyte	Fine-grained porphrytic intermediate extrusive rock; main components are alkali feldspar and minor mafic minerals.
transferral	Deep deposits of mostly eroded parent materials washed from areas directly upslope.

Transferral Soil Landscape	(Soil Landscape terminology) Soil landscapes formed on deep deposits of mostly eroded parent materials washed from areas upslope. Stream channels are often discontinuous and slopes are generally concave. Transferral landscapes include footslopes, valley flats, fans, bajadas and piedmonts.
transgressive dune	General term to cover various types of sand deposit moved in the direction of the effective wind over surfaces other than mobile sand.
transportational site	An area where both sub-surface *in situ* processes and surface processes of lateral movement occur.
Transitional Alpine Humus Soil	Soils characterised by accumulation of humified organic matter incorporated into mineral soil to form dark topsoil over coloured clay loam.
travertine	Calcareous material precipitated from groundwater at a hot spring after passage through calcareous rocks or sediments, sometimes aided by biochemical activity.
trenching rating	(Soil Landscape terminology) *In situ* soils that are sufficiently cohesive (at least when dry) do not generally require shoring supports when excavated for vertical faces or trenches to depths <1.5 m. The ratings are per Finlayson (1982). Note: SM classification is mostly good but can require shoring in some cases. G1 indicates an SM soil.
Triassic period	Period of geological time 180 – 230 million years before present.
trondhjemite	An intermediate intrusive rock like granodiorite but lacking in potassium feldspar.
tuff	Consolidated volcanic ash; water-laid tuffs generally show excellent bedding and may appear like shales or sandstones; pyroclastic fragments are <20 mm in diameter.
tunnel erosion	The removal of subsoil by water while the surface soil remains relatively intact.
turbidites	Fine-grained graded sediment deposited in deep oceanic environments.
Type Profile	(Soil Landscape terminology) Typical sequences of soil materials that occur over significant portions of a soil landscape. Type profiles are usually the most common arrangement of soil materials within any landform element.
U	
understorey	A layer of vegetation below the main canopy

Unified Soil Classification System, USCS	Based on the identification of soil materials by their particle size, system grading, plasticity index and liquid (U.S.C.S) limit. These properties have been correlated with the engineering behaviour of soil including soil compressibility and shear strength (Casagrande, A. 1947). The system is used to determine the suitability of soil materials for use in earthworks, optimal conditions for their construction, special precautions which may be needed, such as soil ameliorants and final batter grades to be used to ensure stability. USCS classifications include: • GW— well-graded gravels, gravel-sand mixtures, little or no fines • GP— poorly graded gravels, gravel-sand mixtures, little or no fines • GM— silty gravels, poorly graded gravel-sand-silt mixtures • GC— clayey gravels, poorly graded gravel-sand-clay mixtures • SW— well-graded sands, gravelly sands, little or no fines • SP— poorly graded sands, gravelly sands, little or no fines • SM— silty sands, poorly graded sand-silt mixtures • SC— clayey sands, poorly graded sand-clay mixtures • ML— inorganic silts and very fne sands, rock four, silty or clayey fne sands with slight plasticity • CL— inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays • OL— organic silts and organic silt-clays of low plasticity • MH— inorganic silts, micaceous or diatomaceous fne sandy or silty soils, elastic silts • CH— inorganic clays of high plasticity, fat clays • OH— organic clays of medium to high plasticity • Pt— peat and other highly organic soils. Borderline soils are marked by dual symbol sets separated by a dash, e.g. ML-CL. The most dominant class is given first.
Uniform soil	A soil in which there is little, if any, change in soil texture between the A and B horizons, e.g., loam over loam, or sandy clay over silty clay (Northcote 1979). See also Duplex soil, Gradational soil, Principal Profile Form.
unripe	Generally wet to saturated muds and alluvium with no soil development.
untreated roads rating	Untreated roads and tracks are made from surface soils that are compacted by traffic. Site consideration such as slope, wetness, rockiness and soil depth are not included. Trafficability and to a lesser extent stoniness and dustiness are considered. Ratings are based on those of Finlayson (1982).
upper storey	The layer of vegetation which is the main canopy layer; top stratum (usually trees).
urban capability	(Soil Landscape terminology) The ability of a parcel of land to support a certain intensity of urban development without serious erosion and sedimentation occurring during construction as well as possible instability and drainage problems in the long-term (Houghton and Charman 1986). Urban capability is ranked based on the severity of

	the limitations that are likely to affect urban land uses (Hannam and Hicks 1980). These are low, moderate and high (to severe). • Low (minor) limitations— indicate areas with little or no physical limitations. Standard building designs may be used. • Moderate limitations— may influence design and impose certain management requirements on developments to ensure a stable land surface is maintained during and after development. These limitations can be overcome by careful design and adoption of site management techniques that ensure land surface stability. • High (to severe) limitations— indicate areas with limitations that are difficult to overcome, requiring detailed site investigation and engineering design. Some areas may be so unsuitable for urban development that they are best left undisturbed. Capability statements for soil landscapes are intended for regional planning purposes only. Any capability statements are general and apply to standard designs. Exceptions to capability statements may arise both for small pockets of land or soil, or the use of non-standard designs. Non-standard designs that consider site and soil constraints may give sustainable solutions. Although the information given may be of sufficient accuracy and detail for the planning of small scale, low value, low impact developments, detailed planning at the local level and more intensive capability assessments dependent on additional information are often necessary. Additional site-specific factors such as slope angle, position on slope, terrain element and specific soil conditions need to be examined and, where necessary, geotechnical engineering reports obtained. General capability rankings for applicable types of urban development are given for each soil landscape.
Urban Capability Classification	A method of land classification which ranks land by the physical constraints applying to various intensities of urban land use. Or a method of land classification which ranks land by its ability to sustain various intensities of urban land use.
urban land	Land associated with cities or towns. Includes residential, commercial and recreational areas and their associated infrastructure. Allotment sizes are generally <1 ha.
V	
valley flat	Small, gently inclined to level flat, aggraded or sometimes eroded by channelled or overbank stream flow, enclosed by hillslopes; a miniature alluvial plain located on a narrow valley floor.
varved shales	Shales deposited from melted ice in a lake in which the depositional layers appear in pairs. Each pair represents a seasonal deposit.
vertic properties	Soil material with a clayey field texture and ≥35% clay which cracks strongly when dry and has slickensides and/or lenticular peds.

Vertosol	(Australian Soil Classification) Clay soils with shrink-swell properties that exhibit strong cracking when dry and at depth have slickensides and/or lenticular structural aggregates. Although many soils exhibit gilgai microrelief, this feature is not used in their definition.
vesicular	A term describing volcanic rocks with small spherical or ellipsoid cavities caused by bubbles of volcanic gas.
Vestigial Soil Landscape	(Soil Landscape terminology) Soil landscapes dominated by sites where shallow soils have formed from in situ weathering of typically resistant parent materials. Landform elements can include summit surfaces, plateaux and old ground surfaces. Rock outcrop may be common.
volcanic rocks	Igneous rocks, generally originating as lavas (i.e. basalt), which have cooled and solidified on the earth's surface.
volcaniclastics	An indurated pyroclastic rock formed from breccia and other fragments explosively ejected from a volcano.
volcano	Typically, very high and very steep landform pattern, without stream channels, or with erosional stream channels forming a centrifugal interrupted tributary pattern. Built up by volcanism, and modified by erosional agents. Typical elements are cone and crater. Includes scarp, hillcrest, hillslope, stream bed, lake and maar.
volume expansion, VE	A volume expansion test measures the free swelling of a disturbed soil sample (sieved <0.425mm) on wetting from air dry to saturation. The method is described in Wickham and Tregenza (1973); Crouch *et al*. (1991); and Craze *et al*. (1993). Volume expansion rankings are modified from Crouch *et al*. (1991). Soils that shrink, fail to saturate or have volume expansions of <3 are usually dispersible and associated with phreatic line tunnel failure in earth dams, especially those that are built with dry soil or are strongly compacted. Dispersion often masks the extent of volume expansion in soils (Mills *et al*. 1980). For dispersible soils, the linear shrinkage test is also recommended to indicate the likelihood of shrink-swell behaviour. When the dispersion percentage is >50%, linear shrinkage testing is recommended.
voluntary native pasture	Cleared land or woodland with a ground cover of grasses and/or legumes which are either native species or naturalised (self-sown) exotic species. Generally lower productivity and nutrient status than improved pastures.

W

water gap	A narrow gorge cut by a stream through a ridge of hard rock.

water repellence	(Soil Landscape terminology) Water repellence is rated after Roberts and Carbon (1971) by the amount of time needed for a droplet of water to be absorbed by a dry soil surface. The effects of water repellence include reduced water infiltration, and poor germination and growth (Handreck & Black 1984) as well as increased run-off and increased erosion. Five degrees of water repellence are recognised: • <1 second— not significant • 1 – 10 seconds— very low • 10 – 50 seconds— low • 50 – 260 seconds— moderate • >260 seconds— very high. Soils that display moderate to very high levels of water repellence are generally acid, sandy soils with high organic matter. They are often poor growth mediums for plants due to slow or uneven wetting patterns and have high rates of run-off. Methodology for the water repellence test is consistent with that of Roberts and Carbon (1971). The original three-category system proposed by these authors has been modified by Craze *et al*. (1993) to the five-class system described.
water-repellent soils	Soils which resist wetting when dry. Drops of water do not spread spontaneously over their surface and into pores. The degree of water repellence may be severe where water drops remain on a flattened surface for some minutes. In other cases, drops appear to be absorbed readily but quantitative measurements show the height of capillary rise is diminished. This characteristic is mainly a feature of some sandy soils (topsoils) and is generally attributed to organic coatings on the sand grains which resist water entry into the soil.
waterlogging	(Soil Landscape terminology) Waterlogged soils have permanent watertables at or near the surface. They may also be non-cohesive, organic, saline, acidic, infertile and have low wet-bearing strength. They are unsuitable for septic effluent disposal. See also permanently high watertables, seasonal waterlogging.
watertable	The upper surface of unconfined groundwater below which the pores of rock or soil are saturated. A perched water table is the surface of a local zone of saturation held above the main body of groundwater by an impermeable layer, usually clay, and separated from it by the unsaturated zone.
wave erosion hazard	(Soil Landscape terminology) The removal of sand or soil from the margins of beaches, beach ridges, dunes, lakes or dams by wave action. Areas such as beaches and foredunes are subject to severe storm wave erosion. They should not be developed.
weak pedality	The soil contains peds that are barely observable.
weathering	The physical and chemical disintegration, alteration and decomposition of rocks and minerals, at or near the earth’s surface, by atmospheric and biological agents.

wet bearing strength, low	(Soil Landscape terminology) Soils with low wet bearing strength are dominated by a limited range of particle sizes. They are pliable and deform easily under pressure when wet; 'quicksand' is an example. If poorly drained, they can be unsuitable for foundations and have poor trafficability when wet. Soils with low wet bearing strength often suffer severe structural damage if cultivated or become mechanically disturbed when they are wet. Low wet bearing strength is rated by the strength of the soil when soil moisture content is greater than at field capacity (Pons and Zonneveld 1965), and indicates 'fluid or very soft mud.
wet sclerophyll	Canopy cover 30 – 70% and maximum height >10 m made up of sclerophyllous trees with at least one moist stratum of mesophytic shrubs and the frequent presence of ferns.
wetland	Areas of swamp, shallow water or waterlogged land. The water cover may be permanent or temporary. The areas are usually characterised by vegetation of a moist-soil or aquatic type.
Wiesenboden	(Great Soil Groups classification) Dark clay to clay loam soils with uniform to gradational texture profiles and varying development of gley features in the deeper subsoil due to intermittent partial saturation associated with seasonal seepage and perched water. Perched water is a saturated layer of soil which is separated from any underlying saturated layers by an unsaturated layer.
wilting point	Point at which the rate of moisture loss from the leaf surface is greater than the uptake from plant roots. The wilting point differs in various soil types by texture.
wind erosion risk	(Soil Landscape terminology) Typically, areas subject to wind erosion are exposed and have easily transported, unconsolidated, loose and fine sand-size aggregates. They are often dry topsoils. Vegetative cover should be maintained to prevent wind erosion.
woodland	Vegetation structure dominated by trees with canopy cover of 10 – 30%.
worming, wormy	Visible condition of vertically exposed soil caused by through-flow transporting erodible fine fraction to the surface often characteristic of high silt content.
X	
Xanthozem	(Great Soil Groups classification) Mainly yellow, friable, strongly-structured clay soils with moderate horizon differentiation and gradational texture profiles.
xenocryst	Crystals in igneous rock which are foreign to the body of rock in which they occur.

xenolith	Rock fragments from a different type of rock that are imbedded in a granitic rock.
Y	
Yellow Earth	(Great Soil Groups classification) Yellow equivalent of Red Earth.
Yellow Podzolic Soil	(Great Soil Groups classification) Strongly differentiated duplex soils with light to medium textured A_1 horizon over a pale A_2 over a yellowish; firm to friable B horizon with generally polyhedral structure.

Rankings for Physical Laboratory Test Results in Soil Landscape Descriptions

Test	Units	Ranking				
		Very low	Low	Moderate	High	Very high
Clay, Cl	%	≤10	>10 – 25	>25 – 40	>40 – 50	>50
Silt, Si	%	≤10	>10 – 25	>25 – 40	>40 – 50	>50
Fine Sand, FS	%	≤10	>10 – 25	>25 – 40	>40 – 50	>50
Coarse Sand, CS	%	≤10	>10 – 25	>25 – 40	>40 – 50	>50
Gravel, Gr	%	≤4	>4 – 17	>17 – 31	>31 – 65	>65
Dispersion Percentage, DP	%	0 – 6	>6 – 30	>30 – 50	>50 – 65	>65
Volume Expansion, VE	%	3 – 10	>10 – 20	>20 – 30	>30 – 40	>40
Linear Shrinkage, LS	%	≤7	>7 – 12	>12 – 17	>17 – 22	>22
Water Erodibility (USLE K)	t.ha.h/ ha.MJ.mm	≤0.01	>0.01 – 0.02	>0.02 – 0.04	>0.04 – 0.06	>0.06
Wind Erodibility	%	≥50	>40 – 50	>25 – 40	>10 – 25	0 – 10
Field Capacity, FC	%	≤10	>10 – 22	>22 – 33	>33 – 44	>44
Permanent Wilting Point, PWP	%	≤5	>5 – 13	>13 – 22	>22 – 30	>30
Plant Available Waterholding Capacity, PAWC	%	≤5	>5 – 10	>10 – 15	>15 – 20	>20
Plasticity, Plas.	USCS	Non-plastic	CL-ML, ML-CL, M, SM, CL, OL	CL-CH	CH-CL, OH-CL, OH-CH, CH, MH	
Saturated Hydraulic Conductivity, K_{sat}	mm/d	>12-240	>240 – 481	>481 – 1,440	>1,441 – 2,880	>2,880
Septic Absorption Potential	USCS	CH, CL, GC, OH, SC	OL, SM	GM, MH, ML, Pt	GW, SP, SW	

Building Foundation Stability	USCS	OH, Pt, MH	OL, CH	CL	SC	SW, GP, GW, CW, GM
Shear Strength	USCS	OL, OH, Pt	ML, MH	CH, SC, SM, SP	CL	GW, SW
Road Subgrade	USCS	CH, OH, Pt	OL, MH	SP, SM, SC, ML, CL	GC, SW	GW, GP, GM
Untreated Roads	USCS	SP, ML, OK, MH, CH, OH, Pt	SM, CL	GW, GM, SW	SC	GC
Trenching Capability	USCS		G (Good, no shoring)	S (Shoring required)		

Rankings for Chemical Laboratory Test Results in Soil Landscape Descriptions

Test	Units	Ranking				
		Very low	Low	Moderate	High	Very high
Acidity (soil:water)	pH	<4.5 (extreme)	<4.5 – 5.0 (very strong)	<5.1 – 5.5 (strong)	5.6 – 6.0 (medium)	6.1 – 6.5 (slight)
Acidity (soil:$CaCl_2$)	pH	<3.7 (extreme)	3.7 – 4.2 (very strong)	4.3 – 4.7 (strong)	4.8 – 5.2 (medium)	5.3 – 5.7 (slight)
Alkalinity (soil:water)	pH	>9.0 (very strong)	8.5 – 9.0 (strong)	7.9 – 8.4 (medium)	7.4 – 7.8 (slight)	6.6 – 7.3 (neutral)
Alkalinity (soil:$CaCl_2$)	pH	>8.2 (very strong)	7.7 – 8.2 (strong)	7.1 – 7.6 (medium)	6.6 – 7.0 (slight)	5.8 – 6.5 (neutral)
Buffering Capacity	kmol(H+) (ha 10 cm)$^{-1}$ (pH)$^{-1}$	<20	20 – <30	30 – <75	75 – <110	≥110
Organic Matter, OM	%	0.5 – 1.0	>1.0 – 2.0	>2.0 – 3.0	>3.0 – 5.0	>5.0
Bray Phosphorus	mg/kg	≤5	>5 – 10	>10 – 20	>20 – 25	>25

Lactate Phosphorus	mg/kg	≤5	>5 – 10	>10 – 17	>17 – 25	>25
Phosphorus Sorption	mg/kg	≤125	>125 – 250	>250 – 400	>400 – 600	>600
Salinity (ECe)	dS/m	0 – 2	>2 – 4	>4 – 8	>8 – 16	>16

Rankings for Exchangeable Cation Test Results in Soil Landscape Descriptions

Test	Units	Ranking				
		Very low	Low	Moderate	High	Very high
Cation Exchange Capacity	me/100 g	≤6	>6 – 12	>12 – 25	>25 – 40	>40
Sum of Bases	me/100 g	≤3	>3 – 7	>7 – 15	>15 – 25	>25
Base Status	-	≤5 (Dystrophic)	>5 – 15 (Mesotrophic)	>15 (Eutrophic)		
Base Saturation	%	≤20	>20 – 40	>40 – 60	>60 – 80	>80
Exchangeable Ca	me/100 g	≤2	>2 – 5	>5 – 10	>10 – 20	>20
Exchangeable Ca/CEC	%	≤10	>10 – 30	>30 – 65	>65 – 85	
Exchangeable Mg	me/100 g	≤0.3	>0.3 – 1	>1 – 3	>3 – 8	>8
Exchangeable Mg/CEC	%	≤3	>3 – 5	>5 – 10	>10 – 15	>15
Exchangeable K	me/100 g	≤0.2	>0.2 – 0.3	>0.3 – 0.7	>0.7 – 2	>2
Exchangeable K/CEC	%	≤1	1 – 2	2 – 5	5 – 8	>8
Exchangeable Na	me/100 g	≤0.1	>0.1 – 0.3	>0.3 – 0.7	>0.7 – 2	>2
Exchangeable Na/CEC	%	≤6 (Non-sodic)	>6 – 15 (Sodic)	>15 – 25 (Strongly sodic)	>25 (Very strongly sodic)	
Exchangeable Al/CEC	%	≤5	>5 – 10	>10 – 15	>15 – 35	>35

Ca/Mg Ratio		<1 (Ca deficient)	>1 – 4 (Ca low)	>4 – 6 (Balanced)	>6 – 10 (Mg low)	>10 (Mg deficient)
Mg/K Ratio		<1 (Mg deficient)	>1 – 2.5 (Mg low)	>2.5 – 5 (Balanced)	>5 – 10	>10 (K deficient)

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