Healthy Land & Water

South East Queensland Land Types Booklet – Sunshine Coast Catchment

Australian Government | National Landcare Program

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Acknowledgements
Information provided in this booklet has been drawn from a number of sources, including:

- Queensland Government, Department Agriculture and Fisheries (DAF), Department of State Development, Infrastructure and Planning (DSDIP) and Queensland Department of Environment and Science (DES)
- Queensland Fire and Biodiversity Consortium (QFBC)
- Sunshine Coast Council
- Noosa Council

We acknowledge the significant contribution by the Queensland Government to this publication. We have customised content in their Grazing Land Types Information sheets to provide more locally relevant information for each major sub-catchment in South East Queensland and to provide valuable supporting information for property management planning.

Acknowledgement of Country
We acknowledge that the place we now live in has been nurtured by Australia's First Peoples for tens of thousands of years. We believe the spiritual, cultural and physical consciousness gained through this custodianship is vital to maintaining the future of our region.

Contact details
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Introduction

The *South East Queensland Land Types Booklet – Mid Brisbane Catchments* supplies land managers in this region with a description of the land types that may be present on their property.

*A **land type** provides a detailed description of the land and its suitability for a range of landuse activities. Land types are based on physical and biological characteristics, including the presence of particular* soils (developed on a common geology), land forms and vegetation communities (or Regional Ecosystems). *A particular land type will have similar capabilities and limitations that can assist in the management of grazing enterprises.* Land type information helps landholders to understand the capabilities of their land and appropriate management to ensure that good land condition is maintained now and into the future.

Landholders can use the Land Resource Area map and descriptions of landform, vegetation communities and Regional Ecosystems contained in this booklet to identify the land type on their properties.

This booklet provides an overview of general principles for sustainable management for all land types. This is followed by a detailed description of each land type in the Mid Brisbane catchments, including vegetation, pastures and soils. Landholders can use this information to understand their land capability, to identify the natural resources on their property and to plan for the appropriate use and management of their land. Each land type information sheet contains data on:

- **Native trees & shrubs.** Outlines the main or dominant tree species found within the broad vegetation communities that occur on each land type.
- **Pasture composition.** Classifies common grasses into desirable, intermediate and undesirable species, with their composition a valuable indicator of pasture condition.
- **Suitable sown pastures.** A range of best-bet grasses and legumes for different land types. Sown pastures are not suitable on all land types and situations and should be carefully considered. It is important to note some exotic grasses and legumes pose a significant threat to the environment because of their tendency to dominate. Species known to pose threats are marked **.
- **Introduced weeds.** Lists declared and environmental weeds often associated with the land type.
- **Soil.** Describes the dominant soil groups for each land type and their key properties which ultimately determine the suitability of the land to different types of land use limitations. More detailed soils information can be obtained from historical Land Resource Assessment undertaken by the Queensland Department of Primary Industries (now the Queensland Department of Agriculture, Fisheries and Forestry, QDAFF), the Department of Natural Resources, or through soil testing.
- **Stocking rates.** a broad estimate of the area in each land type required to support an adult equivalent (AE) – a 450kg non-lactating animal – over a long planning horizon. Long term carrying capacity will depend on the mix of land types on the property and their land condition, the climate, grazing system and landholder goals. All landholders are encouraged to calculate the long term carrying capacity of their properties. QDAFF and SEQ Catchments regularly assist landholders to determine these rates. Contact your SEQ Catchments Community Partnership Management for more information on this service.
- **Utilisation rate.** Refers to the proportion of annual forage growth that is consumed by livestock. The safe utilisation rates listed refer to a maximum rate of average annual uses consistent with maintaining good land conditions for each land type.
- **Land use and management recommendations**. Specific recommendations for the land type to be considered in conjunction with general sustainable land management principles provided on page 3.
- **Land use limitations.** Highlights typical soil and landform characteristics that limit land use and management options.
- **Regional ecosystems.** Lists vegetation communities associated with particular land zones in a bioregion. A full list of REs is provided in the Appendices.
- **Conservation features.** Highlights significant conservation values within each land type and management considerations to protect and enhance these values.

The Glossary provides an explanation of key terms within each of the land type descriptions. Further details on the individual characteristics described in the Land Type Information Sheets are provided in the Appendices. A list of additional sources of information is provided in the section titled 'More Information'.

While the information provided in this booklet can assist landholders to better plan and manage the natural resources on their properties, it should be considered in conjunction with recognised training programs like Property Management Planning, Grazing Land Management, Stocktake and/or site-specific advice from

General Principles of Sustainable Land Management

Sustainable land management involves using the land within its capability to ensure the productivity and economic potential of the land is maintained, whilst its ecological function, such as the ability of the soils to retain water or the landscape to support biodiversity, is not diminished.

Where economic, social and environmental factors are considered simultaneously by land managers, the long-term sustainability of the health, resilience and productivity of a property is more likely to be assured.

- **Manage your property according to the land use capability and limitations**. This is based on an understanding of land resource areas and ecological processes. Consider soil structure, depth and type, slope and drainage in your management decisions. Critical processes include the ability of the soil to retain water and resist erosion.
- **Work cooperatively with neighbours for effective management of landscape scale issues** such as fire management, weeds, animal pests and erosion. This allows for effective management of landscape scale issues such as fire management, weeds, animal pests and erosion. Often this can maximise benefits and increase cost efficiency.
- **Ensure appropriate placement and maintenance of infrastructure** (e.g. roads, bridges, fences, yards and water points). *This may include roads, bridges, drains, soil conservation features such as contours and* waterways, fences, yards and water points to minimise land degradation. A property management plan can guide you in approaching these decisions from a whole of property perspective.
- **Protect and rehabilitate areas that are degraded or at risk from erosion and salinity**. Through fencing and re-establishment of groundcover and native vegetation.

Images: Rehabilitation of degraded areas, such as can be achieved through supplementary planting, can help minimise erosion risk (left image). Promoting diversity, like including trees in grazing landscapes, makes your property more resilient to variations in climate (right image).

- **Control and minimise the spread of declared weeds and pests**. Identify different weed species and adopt good hygiene practices particularly with regard to movements of machinery, livestock, fodder and seed. Plan and implement integrated control measures most appropriate for your situation to reduce negative impacts on production and the environment.
- **Respect and protect indigenous and European cultural heritage sites.** Manage access to significant sites and identify risks to their preservation.
- **Minimise energy use and waste.** This reduces costs and environmental impacts.
- **Maintain high levels of groundcover.** Keep at least 90% of the soil surface covered at all times of the year by managing your stocking rate. This will help prevent erosion, improve water quality and mean your pasture is able to quickly respond to any rainfall.
- **Adopt grazing management practices which maintain good land condition.** Maintain healthy diverse pastures dominated by 3P (Perennial, Productive, Palatable) species by managing utilisation, matching stock numbers to available forage and routine spelling.
- **Monitor and manage your pastures to match stocking rates with pasture availability.** This helps ensure sustainable utilisation of pasture and prevents overgrazing and pasture degradation. It also allows early detection of emerging issues such as pest species or the onset of erosion.

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Image: Resting pastures and monitoring species composition can help you to better manage your grazing for production and environmental outcomes.

- **Adopt sustainable cropping practices**. This includes reduced tillage, stubble retention, use of green manure crops, inclusion of legumes and ley pastures, crop rotations, and regular soil analysis to match inputs to crop and soil needs, prevent soil health decline, soil acidification and erosion.
- **Adopt sustainable irrigation and farming practices**. Implement irrigation and farming practices which improve water use efficiency, minimise nutrient losses, run off and deep drainage and conserve limited water supplies.
- **Protect and manage remnant vegetation and regrowth representing all of the original vegetation communities on your property**. This enhances diversity, resilience and ecosystem function.
- **Retain all large standing and fallen trees with hollows**. Whether alive or dead, organic litter and fallen timber are critical habitat for a range of invertebrates, reptiles, birds and small mammals. Hollows provide important nest sites for wildlife.
- **Improve connectivity between patches of native vegetation in the landscape.** Restore the condition of native vegetation through strategic fencing, fire management, ecological thinning and weed control.
- **Develop a fire management plan for your property and work with neighbours.** Manage fire for the protection of life and property, conservation of biodiversity, protection of commercial forestry interests and pasture management for grazing. Maintain variability in fire frequency, intensity and the timing of burning and implement mosaic or patch burning at property and catchment scales to maximise biodiversity values.**Protect and enhance native vegetation along waterways**. This minimises streambank erosion, filters nutrients, provides habitat, maintains healthy aquatic functions and protects water quality.
- **Manage dams as artificial wetlands.** Use strategic fencing and establish alternative watering points for stock. Provide vegetative buffers around water bodies by encouraging regeneration and revegetation.
- **Leave snags and large woody debris in streams**. This provides habitat and helps control erosion.

Images: Planning for fire is an important aspect of land management (left image); Swamp tea tree (*Melaleuca irbyana*) is an endangered community in South East Queensland (right image).

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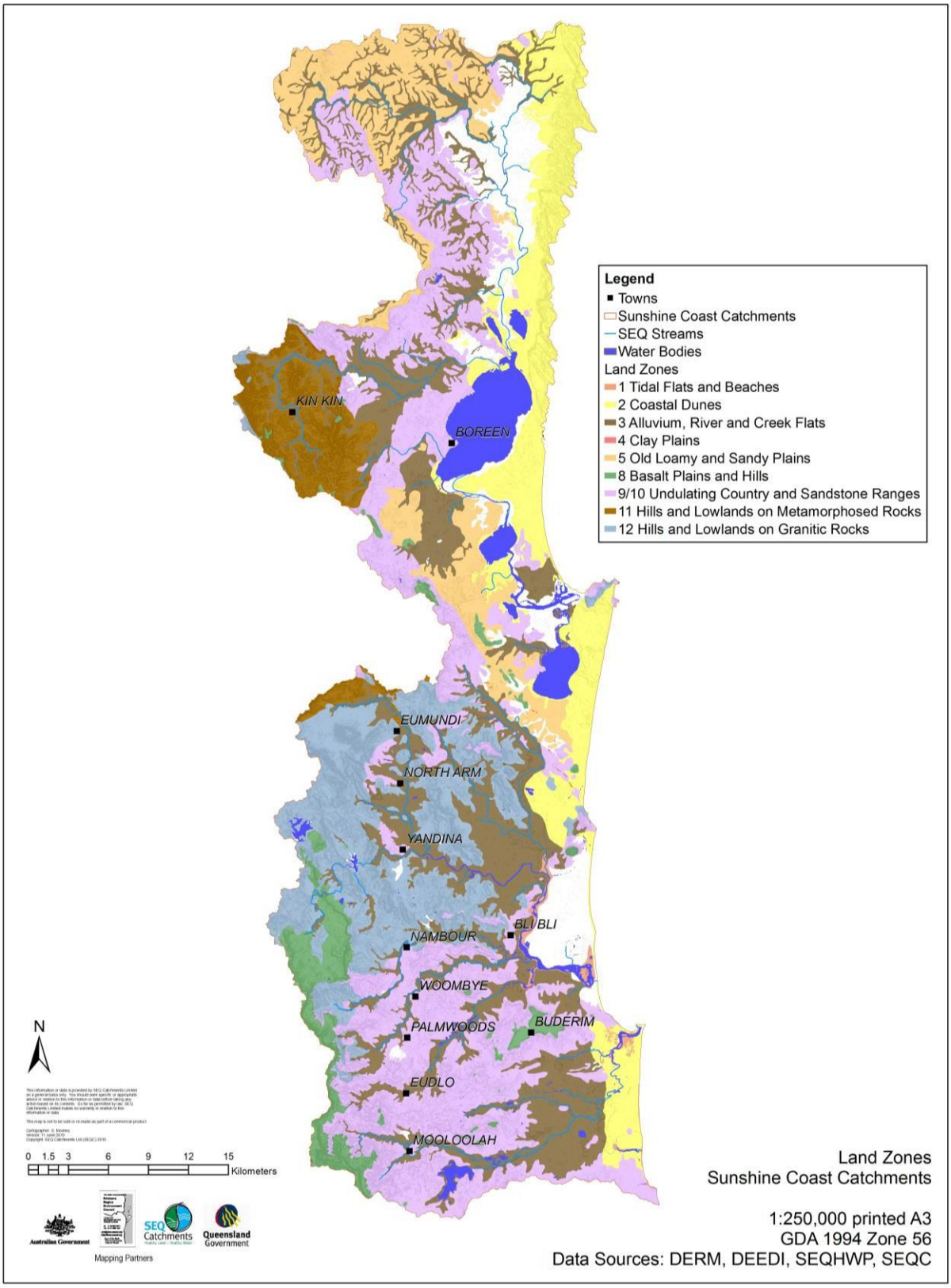
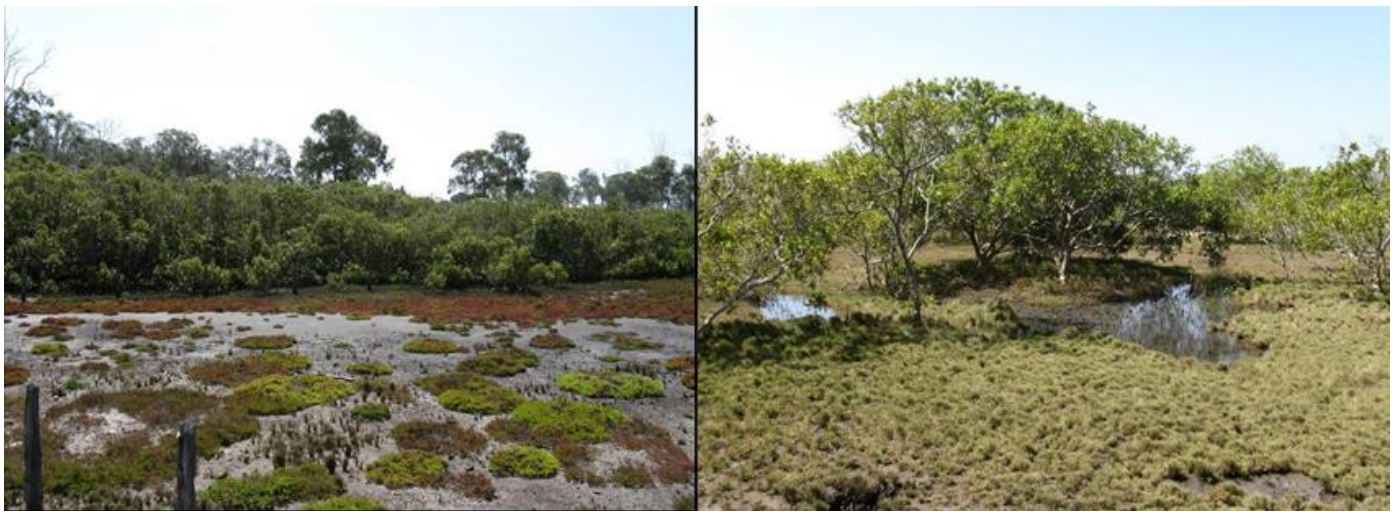
Land Zones of the Sunshine Coast Catchments



Note – Currently no Land Resource Area data is available for the Sunshine Coast.

Mangroves and salt marshes



Land Resource Area	Coastal plains (1a). Land zone 1.
Landform	Intertidal zones and lowlands.
Broad vegetation description	Mangroves and saltmarshes.
Native trees and shrubs	Milky mangrove (Excoecaria agallocha), River mangrove (Aegiceras corniculatum), Grey mangrove (Avicennia marina), Swamp she-oak (Casuarina glauca).
Other associated native species	Marine couch (Sporobolus virginicus), Sea rush (Juncus kraussii), Club rush (Isolepis nodosa), Samphires (Halosarcia spp., Sarcocornia quinqueflora, Sesuvium portulacastrum), Common reed (Phragmites australis).
Suitable sown pastures	Not recommended.
Introduced weeds	Weeds are generally excluded by saline environments. Lippia, Groundsel, Para grass and Blady grass may be present.
Soil	
Description	Gleyed soils and marine muds.
Land use and management recommendations	Exclude fire. These soils may be potential acid sulphate soils. Acid sulfate soil is the name given to soils and sediments containing iron sulfides, the most common being pyrite. When exposed to air due to drainage or disturbance, these soils produce sulfuric acid, often releasing toxic quantities of iron, aluminium and heavy metals. This can have major environmental, health, engineering, and economic effects. For more information, see: www.environment.gov.au/topics/water/water-information/acid-sulfate- soils/about-acid-sulfate-soils.
Common enterprise	Livestock should be excluded.
Regional ecosystems	Dominant: 12.1.3

Conservation features	Occur in the intertidal zone along the coast; mangroves also extend in a narrow band for many kilometres inland along tidal rivers. Generally salt marsh occurs on the landward side of mangroves. Mangroves and salt marshes provide significant feeding and nursery habitat for fish and other marine life. Land reclamation of tidal wetlands for coastal development has significantly impacted these ecosystems worldwide. Waterbirds, including migratory shorebirds, feed and roost in these areas. The threatened Water mouse (Xeromys myoides) feeds in mangroves and builds its nest mounds in salt marsh areas. Another threatened species, Illidge's ant-blue butterfly (Acrodipsas illidgei) is only found in mangroves and associated woodlands where its host ant is found. The health and extent of mangroves and salt marsh can be detrimentally affected by changes in hydrology, particularly flow barriers and influxes of stormwater, nutrients and pollutants. Other human impacts (e.g. mosquito control, recreational use) need to be managed to prevent further damage. All marine plants are protected under Queensland law through provisions of the Fisheries Act 1994. The destruction, damage or disturbance of marine plants without prior approval from Fisheries Queensland is prohibited. For more information visit: www.daff.qld.gov.au/fisheries/habitats. Pigs can cause extensive damage.

Coastal heathlands

Land Resource Area	Coastal plains (1a). Land Zone 2.
Landform	Coastal dunes, headlands and lowlands.
Broad vegetation description	Heathlands and associated scrubs and shrub lands on coastal dune fields and inland montane locations.
Native trees and shrubs	Wallum banksia (Banksia aemula), Coastal banksia (B. integrifolia), Red honeysuckle (B. serrata), Tea trees (Leptospermum spp.), Leucopogon spp., Wallum hakea (Hakea actites), Wallum grasstree (Xanthorrhoea fulva), Blunt-leaved pea (Pultanea retusa), Pink bloodwood (Corymbia intermedia), Black she-oak (Allocasuarina littoralis, Guinea flower (Hibbertia spp.).
Pasture composition	Grasses and legumes are sparse. Blady grass (undesirable) can invade frequently burnt areas.
Suitable sown pastures	It is recommended that heathlands be conserved and not developed for pastures. Setaria and Paspalum are moderately productive with fertilizer input – note conservation features on following page.
Introduced weeds	Groundsel.
Soil	
Description	Sand.
Key properties	Plant available water capacity: Low. Fertility: Low. Erodability: Low.
Common enterprise	Livestock should be excluded from these heathlands.
Land use and management recommendations	Native species should not be supplemented with introduced species. Burn late summer to winter with a moderate to high (due to inherent characteristics of highly flammable vegetation) fire. Ensure burning conditions are conducive to the maintenance of landscape integrity (i.e. use good soil moisture, recent rainfall, standing water on ground). Burning frequency should be 8–20 years. Aim for a burn mosaic of 25–50% but realistically, this will be difficult to achieve. Attempt to retain some areas unburnt. Do not re-light areas remaining unburnt after the initial fire.

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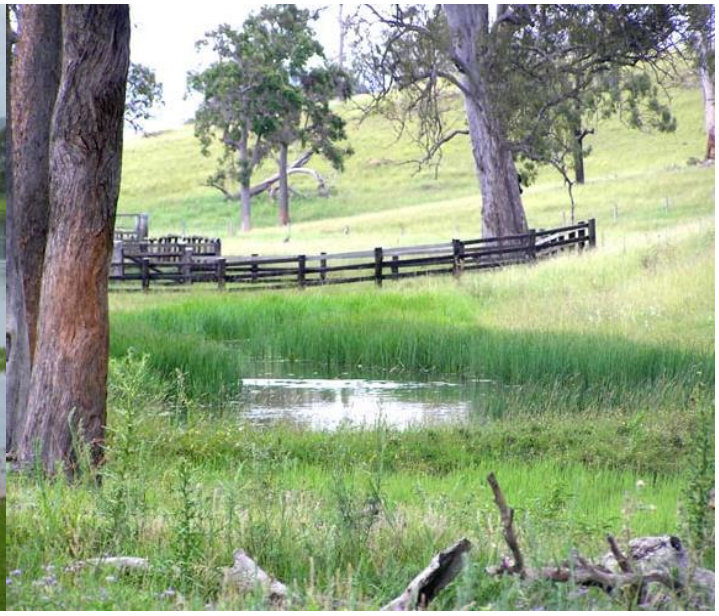
	Always communicate with your local Rural Fire Brigade regarding planned burns. Refer to the SEQ Fire and Biodiversity Consortium for more information: www.fireandbiodiversity.org.au.
Land use limitations	These wetlands become waterlogged after rain and may be seasonally inundated.
Regional ecosystems	Dominant: 12.2.9, 12.2.12, 12.2.15, 12.3.13, 12.3.14
Conservation features	These heathlands occur principally on the Sunshine Coast and sand mass islands, with a naturally restricted extent on the mainland south of Noosa. They are one of the communities included under the common name 'wallum'. Floristically rich. Vegetation clearing, hydrological change and inappropriate fire have had a significant impact on the condition and extent of these wetlands, particularly mainland areas south of Noosa. This has led to one Regional Ecosystem (12.2.12) being considered to be endangered in this area. Several threatened species are known to inhabit these wetlands, including the Ground parrot (*Pezoporus wallicus*), Honey blue eye (*Pseudomugil mellis*), Oxyleyan pygmy perch (*Nannoperca oxleyana),* Water mouse (*Xeromys myoides*), Acid frogs (*Crinia tinnula, Litoria freycineti, L. olongburensis*), Swamp orchids (*Phauis australis, P. tancarvillae*), Christmas bells (*Blandfordia grandiflora),* the lilly *Sowerbaea* subtilise, Bogrush *(Schoenus scabripes)*,Tiny wattle *(Acacia baueri* ssp. *baueri),* Sundews (*Drosera* spp.*)* and Bladderworts (*Utricularia* spp.). Pigs can cause extensive damage.

Grass-sedge wetlands



Land Resource Area	Principally coastal plains (1a), fine textured alluvial plains (1b) and mixed alluvial plains (1c). Land Zone 4.
Landform	Depressions in marine or alluvial plains, especially backplains.
Broad vegetation description	Freshwater wetlands seasonally dominated by grasses and sedges.
Native trees and shrubs	Queensland blue gum (Eucalyptus tereticornis) (T) around edges. (T) = Suitable timber species - note conservation features over page.
Other associated native species	Sedges *(Cyperus* spp.*)*, Clubrushes *(Schoenoplectus* spp.*)*, *Eleocharis* spp., Common reed *(Phragmites australis)*, Cumbungi (*Typha* spp.*)*, Water snowflakes *(Nymphoides indica)*, Smartweeds and knotweeds *(Persicaria* spp.*)*, Nardoo (*Marsilea mutica*), Water ribbons (*Triglochin procerum*).
Native and naturalized grasses	Water couch (Paspalum distichum), Swamp ricegrass (Leersia hexandra), Ischaemum spp. and *Chloris* spp.
Suitable sown pastures	It is recommended that no introduced pasture species be sown in these wetlands.
Introduced weeds	Lippia, Water primrose, Para grass, Water hyacinth.
Soil	
Description	Brown to black medium to heavy clays,
Key properties	Plant available water capacity: High Fertility: Medium. Salinity: Non-saline (except in marine areas) Sodicity: Non-sodic
Enterprise	Seasonal grazing by livestock. Refer to Conservation Features (below).

Land use and management recommendations	Livestock should be excluded from these wetlands during wet periods and native species flowering and seed set. Native pasture species should not be supplemented with introduced species. Exclude fire.
Land use limitations	These wetlands become waterlogged after rain and are seasonally inundated.
Regional ecosystems	Dominant 12.3.8
Conservation features	Many areas of this wetland type have not been mapped due to their small size. Changes to water flows, particularly the construction of levee-banks and damming of water courses, have caused significant changes to these wetlands including the loss of native species and their replacement by weed species. Grazing management to exclude stock access during strategic stages, e.g. when soils are susceptible to pugging or wetland plants have not completed seeding, may enable long-term productive use whilst maintaining biodiversity values and ecological function. These wetlands provide habitat for numerous wetland plants and animals, including snipe, bitterns, waterfowl, and frogs and are particularly important as refugia during dry conditions. Frogbit (Hydrocharis dubia) is a threatened plant that occurs in these wetlands. Pigs may be a management issue.

Paperbark forests on coastal sediments and alluvia

Land Resource Area	Coastal plains (1a). Land Zone 3 and Land Zone 5.
Landform	Alluvial plains, swamps, dune systems and tidal flats near the coast.
Broad vegetation description	Melaleuca on seasonally inundated (by fresh water) open-forests and woodlands of lowland coastal swamps and fringing lines.
Native trees and shrubs	Coastal paperbark (Melaleuca quinquenervia), Prickly-leaved paperbark (M. nodosa), Swamp oak (Casuarina glauca), Swamp mahogany (Eucalyptus robusta)(T), Swamp box (Lophostemon suaveolens), Large-leaved cheese tree (Glochidion sumatranum), Wild may (Leptospermum polygalifolium), Cabbage tree palm (Livistona australis), Keys boronia (Boronia keysii), Hop bush (Dodonaea rupicola). (T) = Suitable timber species - note conservation features over page.
Pasture composition	Native pastures are sparse or absent. If present, species may include Golden beard grass, Black spear grass and Kangaroo grass, Ferns and sedges are often present, and can form a dense ground layer. *Denotes non-native 'Expected Pasture Composition' species.
Desirable pasture species	Kangaroo grass, Golden beard grass, Black spear grass, Barbed wire grass, Paspalum*, Pangola*, Rhodes grass*.
Intermediate pasture species	Cockatoo grass, Queensland blue couch*, Mat grass*.
Undesirable pasture species	Wiregrasses, Blady grass, Slender chloris, Native rat's tail, Poverty grass.
Suitable sown pastures	Rhodes grass, Setaria, Pangola, Paspalum, Creeping vigna, Lotononis, Jointvetch, Villomax, Lotus, Humidicola.
Introduced weeds	Hymenachne, Blady grass, Bracken fern, Groundsel bush, Para grass, Lantana.

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Soil	
Description	Typical soil groups are Humic Gleys, coarse structured clays, Humus Podzols and Soloths derived from estuarine clays, alluvium and wind-blown sand. These soils are frequently grey because of poor drainage and frequent water logging. These soils are potentially acid sulphate soils. Acid sulfate soil is the name given to soils and sediments containing iron sulfides, the most common being pyrite. When exposed to air due to drainage or disturbance, these soils produce sulfuric acid, often releasing toxic quantities of iron, aluminium and heavy metals. This can have major environmental, health, engineering, and economic effects.
Key properties	Plant available water capacity: Low to medium. Fertility: Variable, but commonly low. Effective rooting depth: Dependent on water table.
Stocking rates	Cleared native pastures: 1 Adult equivalent / 5 ha. Improved pastures (dryland): 1 Adult equivalent / 2 ha.
Common entrerprise	Cattle breeders and stores. Exotic pine plantations.
Land use and management recommendations	Extensively cleared for sugar cane and urban development. Subject to weed invasion, especially groundsel which may form dense stands. Crops: Water tolerant, shallow rooted crops are most suited to these poorly drained soils. High seasonal watertable restricts crop growth in summer months. Sugar cane is grown successfully where drainage is provided. Pastures: With drainage and fertilizer, these soils are suitable for establishment of improved pastures. Fertilizer applications of N and P are generally required for crop and pasture production. Burn at 8–20 year intervals in late summer and autumn with a moderate to high intensity fire to assist with Melaleuca regeneration. Aim for 25–70% burn mosaic with surrounding ecosystems as Melaleuca ecosystems often occur in patches and natural drainage lines. Fires in these areas may, with the conditions and type of vegetation, burn larger areas and other vegetation types. Ensure secure boundaries from non-fire-regime adapted ecosystems. High soil moisture (or presence of water on ground) is required, to avoid peat-type fires.
Land use limitations	These soils are infertile and require nutrient inputs and drainage for sustainable farming. Factors which may limit land use at some locations including waterlogging, flooding, hard setting surfaces, soil sodicity, soil salinity, extreme soil acidity, hardpans and nutrient leaching. Both internal and external drainage are poor. The watertable is always relatively high. Implement surface and sub- surface drainage to lower the watertable (paying attention to possible acid sulfate occurrence). Soil surface tends to crust which reduces infiltration and creates poor soil-seed contact. Chemical toxicities (especially aluminium and manganese) may be a problem where these soils are strongly acid. Potential acid sulfate soils frequently occur. Drainage and exposure of subsoil may release sulfuric acid.
Regional ecosystems	Dominant: 12.2.5, 12.2.7, 12.3.5, 12.3.6

Conservation features	These forests play a critical role in the hydrological regime of the coastal plain. They provide nesting and roosting sites for bird and bat species, important food resources for migratory species including flying-foxes and woodland birds (kingfishers, whistlers and robins) and seasonal habitat for frogs. The autumn and spring flowering cycles of various plants attract lorikeets, honeyeaters and flying-foxes. Threatened flora and fauna include swamp orchids (*Phaius australis* and *P. tancarvilleae*), the rare herbaceous plant *Durringtonia paludosa*, acid frogs (*Crinia tinnula, Litoria freycineti and L. olongburensis*), water mouse (*Xeromys myoides*) and honey blue eye (*Pseudomugil mellis*). Remnants are particularly susceptible to weed invasion on their margins. Landscape connectivity is important for wildlife corridors. Too frequent fires have affected regeneration in some areas. Infrequent fires at intervals of 15--30 years are recommended to retain wetland integrity.

Blue gum on coastal sediments and alluvial plains

Land Resource Area	Fine textured alluvial plains (1b). Land zone 3.
Landform	Flat to gently undulating alluvial plains, levees and terraces (0–3% slope) along rivers and creeks.
Broad vegetation description	Remnants of Queensland blue gum woodland with a grassy understorey. Also Swamp mahogany, Moreton Bay ash, Gum topped box and Broad-leaved Apple.
Native trees and shrubs	Queensland blue gum (Eucalyptus tereticornis) (T), Gum topped box (E. moluccana) (T), Moreton Bay ash (Corymbia tessellaris), Swamp box (Lophostemon suaveolens), Brisbane wattle (Acacia fimbriata), Maiden's wattle (A. maidenii), Hickory wattle (A. disparrima), Black tea-tree (Melaleuca bracteata), Broad-leaved apple (Angophora subvelutina). (T) = Suitable timber species - note conservation features over page.
Pasture composition	*Denotes non-native 'Expected Pasture Composition' species.
Desirable pasture species	Queensland bluegrass, Forest bluegrass, Kangaroo grass, Black spear grass, Rhodes grass*, Creeping bluegrass*, Scented top, Paspalum* and native legumes.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbed wire grass, Couch grass*, Native panic, Umbrella grass, Spring grass, Slender bamboo grass, Liverseed grass*.
Undesirable pasture species	Wire grass, Slender chloris, Blady grass and Native rat's tail grass.
Legumes	Rhynchosia, Creeping tick trefoil, Glycine pea and Woolly glycine.
Suitable sown pastures	Rhodes (Callide), Creeping bluegrass, Angleton grass, Leucaena, clovers, medics Pangola, Paspalum, Kikuyu, Setaria, Green panic grass. Lucerne, Siratro, Burgundy bean, clovers, medics and Lotononis (coastal).
Introduced weeds	Chinese celtis, Lantana, Green cestrum, Annual ragweed, Blue heliotrope, Lippia, Fireweed.

Soil	
Description	Dominantly deep, dark grey to dark brown cracking clays on alluvial flats (black earths) or free draining loamy soils associated with watercourses (prairie soils). Occasional gilgai development. Lime is commonly present in cracking clays subsoils.
Key properties	Plant available water capacity: Medium to high. Fertility: Medium to high. pH: Surface – Variable (6 to 8). More alkaline in subsoil. Salinity: Very low. Sodicity: Non-sodic. Cracking clays occasionally sodic at depths > 0.6 m. Effective rooting depth >1.2 m for loams and >1.5 m for cracking clays.
Stocking rates	Cleared native pastures: 1 AE / 3 ha. Improved pastures: 1 AE / 1 ha.
Utilisation	Conservative pasture utilisation: 35% by weight.
Enterprise	Predominantly cropping; fattening on native and improved pastures.
Land use and management recommendations	Historically extensively developed for agriculture, including wide range of dryland and irrigated crops and pastures. Soils are suitable for most grain, fodder and small crops. A coordinated drainage strategy of subsurface drains, diversion banks and crop layout design is required in intensively developed areas. Adopt practices such as minimum tillage, stubble mulching, include green cover crops in crop rotations and retain crop residues to maintain soil structure and reduce erosion. Maintain adequate surface cover at all times in areas used for grazing. Spell pastures when flowering and seeding. Control declared and environmental weeds. Burn with a low intensity fire in summer to late autumn every 3 to 6 years. Aim to burn 30 to 60% of any given area. Spot ignition in cooler or moister periods encourages mosaics. Always communicate with your local Rural Fire Brigade regarding planned burns. Refer to the SEQ Fire and Biodiversity Consortium for more information: www.fireandbiodiversity.org.au.
Land use limitations	Slow drainage, particularly black earths with high clay content, may cause waterlogging and restrict growth of some crops. Alluvial loams become cloddy after cultivation and may become hard setting if compacted by continual cropping. Local frosts and flooding may occur. Erosive flooding may be a high risk in some locations. Surface runoff may be high, particularly following irrigation. Overland flow may cause rill and sheet erosion on unprotected surfaces. Stream banks are susceptible to erosion.
Regional ecosystems	Dominant: 12.3.11.
Conservation features	While blue gum is common, blue gum communities have been extensively cleared and fragmented. As an endangered regional ecosystem, intact remnants and regrowth areas have high conservation significance. Freshwater wetlands which are important for biodiversity & ecosystem function are associated with this land type. Large, mature blue gums containing hollows are important nesting sites and habitat for a variety of birds and marsupials. Regrowth regenerates rapidly in the absence of grazing and frequent fire.

Riparian forests

Land Resource Area	Fine textured alluvial plains (1b). Also mixed alluvial plains (1c) and coastal plains (1a). Land Zone 3.
Landform	Narrow strips along creeks or rivers where enough moisture is available.
Broad vegetation description	Narrow fringing strips of eucalypt dominated open-forest and woodlands to gallery rainforest (notophyll vine forest) on alluvial plains and riverine systems.
Native trees and shrubs	Red bottlebrush *(Melaleuca viminalis)*, Black tea-tree *(M. bracteata)*, River she-oak *(Casuarina cunninghamiana)*, Queensland blue gum *(Eucalyptus tereticornis)* (T), Flooded gum *(E. grandis)* (T), Brush cherry *(Syzigium australe)*, Weeping lilly pilly *(Waterhousia floribunda)*, Water gum *(Tristaniopsis laurina)*, Native elm *(Aphananthe philippinensis)*, Black bean *(Castanospermum australe)* (T), White cedar *(Melia azedarach)* (T), Sandpaper fig *(Ficus coronata)*, Silky oak *(Grevillia robusta)* (T), Native frangipani *(Hymenosporum flavum)*, Quandong *(Elaeocarpus grandis* (T), *E. obovatus)*, Red cedar *(Toona ciliata)* (T), Brisbane wattle *(Acacia fimbriata)*, Maiden's wattle, *(A. maidenii)*. (T) = Suitable timber species – note conservation features over page.
Other associated native species	Mat rush (Lomandra longifolia, L. hystrix), Blueberry lily (Dianella caerulea).
Pasture composition	**Denotes non-native 'Expected Pasture Composition' species.*
Desirable pasture species	Kangaroo grass, paspalum*, kikuyu*, barbed wire grass.
Intermediate pasture species	Pitted blue, couch grass*.
Undesirable pasture species	Wiregrasses, blady grass, slender chloris, native rat's tail.
Suitable sown pastures	Not recommended.

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Introduced weeds	Chinese celtis, cats claw creeper, Madeira vine, balloon vine, climbing asparagus, camphor laurel, mulberry, lantana.
Soil	
Description	Alluvial sandy loams through to clay deposits adjacent to streams.
Key properties	Plant available water capacity: Medium to high. Fertility: Medium to high. Salinity: Very low. Sodicity: Non-sodic. Effective rooting depth: >1 m.
Stocking rates	Cattle should be grazed only intermittently (See Land use and management recommendations below).
Enterprise	Riparian forests should be protected and conserved.
Land use and management recommendations	Riparian forests should be fenced and grazing restricted to managing grasses and weeds. Maintain groundcover cover and minimise erosion. Where Chinese celtis is a problem, adopt short periods of high intensity grazing in combination with other weed control methods. Access to streams by livestock should be avoided or carefully managed. Avoid intentionally burning this fringe vegetation. Burn surrounding ecosystems in conditions that minimise fire incursion. Always communicate with your local Rural Fire Brigade regarding planned burns. Refer to the SEQ Fire and Biodiversity Consortium for more information: www.fireandbiodiversity.org.au.
Land use limitations	Soils are often highly erodible.
Regional ecosystems	Dominant: 12.3.1, 12.3.2.
Conservation features	Riparian forests occur along streams forming an intricate network extending from upland areas through to coastal lowlands. They provide corridors and habitat for a unique and variable group of communities in which regeneration is closely linked with disturbance caused by variations in stream flows. River she-oak often dominates riparian forests; however in well protected upland and fertile lowland reaches, communities of gallery rainforests are supported. Riparian forests and associated geomorphic habitats of rounded basalt boulders and gorges through to sandstones and coastal estuaries support a plethora of essential habitat for many species including stream frogs, platypus, fish nurseries and macro- invertebrates, many of which are rare or threatened. Catchment management activities are aimed at conserving and restoring riparian forests to enable functioning corridors and the maintenance of essential habitat and water quality. Feral pigs can cause extensive damage.

Mixed open forests on duplexes and loams

Land Resource Area	No land resource area mapping is available for this land type. Land Zone 9/10.
Landform	Undulating plains, low hills & ridges on consolidated sediments (phyllites, sandstones and shales).
Broad vegetation description	Eucalypt dry woodlands to open-woodlands on sandplains or depositional plains.
Native trees and shrubs	Spotted gum (Corymbia citriodora subsp. variegata)(T), Pink bloodwood (C. intermedia)(T), Moreton Bay ash (C. tessellaris), Grey gums (Eucalyptus major, E. propinqua)(T), Grey ironbark (E. siderophloia)(T), Silver-leaved ironbark (E. melanophloia), Gum-topped box (E. moluccana)(T), Brush box (Lophostemon confertus)(T), Smooth-barked apple (Angophera leiocarpa), Wattles (Acacia spp.). (T) = Suitable timber species note conservation features over page.
Pasture composition	**Denotes non-native 'Expected Pasture Composition' species.*
Desirable pasture species	Queensland bluegrass, Forest bluegrass, Kangaroo grass, Black spear grass, Rhodes grass*, Creeping bluegrass*, Scented top, Paspalum*, native legumes.
Intermediate pasture species	Cockatoo grass, Pitted bluegrass, Barbed wire grass, Couch grass*, Native panic, Mat grass*.
Undesirable pasture species	Wire grass, Blady grass, Poverty grass, Swamp foxtail, Native rat's tail grass.
Legumes	Emu foot, Woolly glycine, Rhynchosia, Creeping tick trefoil.
Suitable sown pastures	Rhodes (Callide, Katambora), Creeping bluegrass, Signal grass, Pangola, Paspalum, Kikuyu, Setaria, Green panic grass. Stylo (shrubby and Caribbean),,Lotus, Jointvetch, clovers, medics and Lotononis (coastal).
Introduced weeds	Blady grass, Bracken fern, Groundsel bush.

Soil	
Description	Lithosols, soloths & red podzolics. Texture contrast soils of brown to dark grey loamy sands overlaying red, brown or yellow clay. Surface - sandy or loamy, loose to hard setting surface soil.
Key properties	Effective rooting depth < 0.4 m (solodics) to < 1.5 m (podzolics) Dispersible subsoil. Plant available water capacity: Low. Fertility: Variable, but commonly low. pH: Surface - acid to neutral (4.5 to 6.5). Subsoil: Soloths and podzolics – acid (5.0 to 6.0). Solodics – alkaline (8.0 to 9.0). Salinity: Very low at surface; high at depth. Sodicity: Non-sodic at surface; strongly sodic at depth (solodics).
Stocking rates	Native pastures: Uncleared 1 AE / 5 ha; Cleared 1 AE / 3-4 ha. Sown dryland: 1 AE / 2-3 ha.
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Cattle breeding and fattening.
Land use and management recommendations	Suitable for grazing of native and improved pastures. Timber reserves. Maintain maximum surface cover at all times. Over-sowing of legumes should be done with minimal soil disturbance (e.g. strip cultivation). Maintain as much timber cover as possible, especially on steeper slopes and ridges. Burn every 6 to 25 years in summer to winter with a low to moderate fire to control thick regrowth if restricting grass cover. Aim for a 25% to 50% mosaic burn. Burn with soil moisture and with spot ignition strategy so that a patchwork of burnt/unburnt is achieved.
Land use limitations	Plant growth limited by tough clay subsoil and hard setting surfaces. Rooting depth limited by hard, and saline or acid, subsoils. Hard clay subsoils impede drainage and are prone to waterlogging in wet periods. Very susceptible to sheet, tunnel and gully erosion. Generally very low nutrient status, particularly nitrogen and phosphorus.
Regional ecosystems	Dominant: 12.5.4, 12.9-10.1, 12.9-10.4, 12.9-10.7, 12.9-10.9, 12.9-10.17
Conservation features	Mature coastal woodlands can be rich in wildlife. They support sugar gliders, arboreal marsupials, hollow breeding birds, birds of prey and micro-bats. Retention of ground litter provides important habitat for ground dwelling reptiles. The small seasonal wetlands associated with this land type support an array of amphibians and aquatic invertebrates. De-stocking these areas during the growing season will be of benefit to pastures and wildlife. These woodlands have evolved with fire and are best managed with a range of fire regimes and intensities that result in a mosaic of habitat areas and feed areas. Too frequent, hot fires are damaging. Although currently not of concern, the larger regional ecosystems have been extensively cleared (and fragmented) for cropping, grazing and peri-urban development. Managing regrowth to link remnants is desirable.

Rainforest (closed forest) on basalts

Land Resource Area	Principally Red volcanics (2a). Also Basaltic uplands (2b). Land Zone 8.
Landform	Undulating rises to rolling low hills and plateaux (slopes 3-40%).
Broad vegetation description	Upland and Lowland Complex notophyll vine forest and Araucarian notophyll vine forest on basic volcanics.
Native trees and shrubs	Figs (Ficus spp.), Booyongs (Argyrodenron spp.), Yellow carabeen (Slonea woolsii), Rosewood (Dysoxylum fraserianum), Lilly pillies (Syzygium spp.), Sassafras (Doryphora sassafras), Rose marara (Pseudoweinmannia lachnocarpa), Corkwood (Ackama paniculosa), Bolly gum (Litsea reticulata), Hoop pine (Araucaria cunninghamii)(T), Flame tree (Brachychiton acerifolius), Lace bark (Brachychiton discolour), Brush box (Lophostemon confertus)(T), Bangalow palm (Archontophoenix cunninghamiana), Walking stick palm (Linospadix monostachya), Acronychias (Acronychia spp.), Native tamarind (Diploglottis australis), Giant stinging tree (Dendrocnide excelsa), Celery wood (Polyscias elegans), Scentless rosewood (Synoum glandulosum), Poison peach (Trema tomentosa), White cedar (Melia azedarach)(T), Red cedar (Toona ciliata)(T). (T) = Suitable timber species.
Pasture composition	No native pastures in uncleared rainforest. Some naturalised paspalum and mat grass and minimal grassy understorey after clearing. *Denotes non-native 'Expected Pasture Composition' species.
Desirable pasture species	Queensland bluegrass, Forest bluegrass, Kangaroo grass, Black spear grass, Rhodes grass*, Kikuyu*, Paspalum*, Green panic grass*, Mat grass*.
Intermediate pasture species	Pitted blue grass, Barbed wire grass, Couch grass*, Early spring grass, Red natal grass*.
Undesirable pasture species	Wiregrasses, blady grass, slender chloris.
Suitable sown pastures	Rhodes, prairie grass, kikuyu, paspalum, green panic, setaria. White clover, glycine, siratro, Leucaena.
Introduced weeds	African boxthorn, privet, lantana, bracken fern, blady grass, wild tobacco, Crofton weed, fireweed.

Soil	
Description	Deep, (often >5 m) red, strongly structured clays that are friable and highly permeable. Occurs also on shallow, dark friable clay loams and clays over weathered parent rock. Shallower soils have bedrock at 0.3-0.8 m.
Key properties	Plant available water capacity: High. Low in shallow soils. Fertility: Medium to high. pH: Krasnozems: Surface – acid (5.5 to 6.5). Subsoil – more acid (4.8 to 6.0) Prairie soils: Surface – slightly acid (6.5). Subsoil – strongly alkaline (8.5) Salinity: Low to very low. Sodicity: Non-sodic. Effective rooting depth <0.8 m (prairie) to >1.5 m (krasnozems).
Stocking rates	Cleared native pastures: 1 AE / 3 ha. Improved pastures: 1 AE / 2 ha,
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Cattle breeding and fattening; dairying; hoop pine plantations.
Land use and management recommendations	Suitable for grazing of improved pastures, dryland and irrigated cropping. Maintain maximum surface cover to maintain soil structure and reduce erosion. Avoid trafficking and cultivation when wet to reduce soil compaction. Rotate intensively cultivated crops with broadacre field crops and legumes to improve soil structure and fertility. Periods under pasture rotation are recommended to enhance long-term soil stability and soil organic matter content. Regular additions of fertiliser are required to maintain productivity. Lime application required on average every 3–5 years. Do not cultivate on slopes greater than 10–15%. Adopt practices such as minimum tillage, stubble mulching, and weed control to maintain soil structure and reduce erosion on sloping lands. Do not burn deliberately. May need active protection from wildfire in extreme conditions or after prolonged drought. Planned burns should be conducted at the ecotone of dry rainforest, burning away from the dry rainforest areas. Ensuring conditions of good soil moisture and moisture of litter in surrounding communities will limit fire intensity.
Land use limitations	Surface structure becomes cloddy and hard setting under cultivation; plough pans may develop. Effective rooting depth limited by very strong acid subsoils. Fertility is variable and declines rapidly under development. Highly erodible on cultivated slopes >3% (krasnozems). Prairie soils are moderate to high erosion risk, particularly on steeper slopes. Shallow soils often stony and <0.5 m above weathered bedrock. Landslip risk in some areas.
Regional ecosystems	Dominant: 12.8.3.
Conservation features	Habitat for endemic and rare and threatened flora and fauna. These rainforests on the fertile elevated plateaux have been extensively cleared and established with kikuyu. The remnants tend to be small and are threatened at the margins by weed invasion. Outside of national parks and reserves, the lack of connectivity in the landscape threatens species that make up and inhabit these rainforests.

Softwood vine scrub

Land Resource Area	Principally Marburg scrub (7c). Also Marburg forest (7a) and Basaltic uplands (2b). Land Zone 8.
Landform	Mid to upper slopes of rolling hills and steep hills (3-30% slopes).
Broad vegetation description	Notophyll vine forests and Araucarian notophyll and microphyll vine forests, occasionally with Eucalypt emergents, on fine-grained sediments, metasediments and basic to intermediate (to acid) volcanics.
Native trees and shrubs	Hoop pine (Araucaria cunninghamii)(T), Crow's ash (Flindersia australis)(T), Southern silver ash (F. schottiana)(T), Deep yellowwood (Rhodesphaera rhodanthema)(T), Brush whitewood (Atalaya salicifolia), Hoop pine (Araucaria cunninghamii)(T), Southern silver ash (F. schottiana), Deep yellowwood (Rhodesphaera rhodanthema)(T), Brush whitewood (Atalaya salicifolia). (T) = Suitable timber species.
Pasture composition	Minimal Grassy understorey. *Denotes non-native 'Expected Pasture Composition' species.
Desirable pasture species	Queensland blue, forest blue, kangaroo, Rhodes*, kikuyu*, paspalum*, green panic*, early spring grass.
Intermediate pasture species	Red Natal*, pitted blue, barbed wire, couch grass*, native panic, early spring grass.
Undesirable pasture species	Wiregrasses, blady grass, slender chloris, native rat's tail. Woolly glycine, Glycine pea, Clover glycine.
Suitable sown pastures	Callide Rhodes, green panic, kikuyu, paspalum, creeping bluegrass. Siratro, glycine, clovers, medics, stylos (shrubby & fine stem), Leuceana.
Introduced weeds	African boxthorn, lantana, creeping lantana, fireweed.
Soil	
Description	Friable, well drained loamy soils that are brown, yellowish brown or reddish brown (brown earths). Some soils are shallow dark, clay loams over weathered parent rock (prairie soils).

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Limitations	Bedrock 0.3 to 0.8 m in shallow clays.
Key properties	Plant available water capacity: Low to medium. Fertility: Medium to high. pH: 6.5 to 7 at surface. Subsoils variable (6.4 to 8.5). Salinity: Very low to low. Sodicity: Non-sodic. Effective rooting depth <1 m
Stocking rates	Cleared native pastures: 1 AE / 3 ha. Improved pastures: 1 AE / 1 ha
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Cattle breeding and fattening; hoop pine and hardwood plantations.
Land use and management recommendations	Suitable for grazing of improved pastures and timber plantations. Not suitable for irrigation; duplex soils are not suitable for agricultural development. Short-term forage crops may be grown in better drained areas. Adopt practices such as minimum tillage, stubble mulching, weed control to maintain soil structure and reduce erosion. Include cover crops in crop rotations and retain crop residues. Maintain adequate surface cover at all times. Spell pastures when flowering and seeding.
Land use limitations	Moderate to high risk of erosion (especially tunnel erosion) on all slopes without adequate surface cover. Shallow and stony soils, low plant available water capacity. Susceptible to compaction, hard setting and rapid decline in soil fertility if cultivated. Areas may act as intake for groundwater recharge, thereby contributing to salinity problems in lower areas. Do not burn deliberately. May need active protection from wildfire in extreme conditions or after prolonged drought. Planned burns should be conducted at the ecotone of dry rainforest, burning away from the dry rainforest areas. Ensuring conditions of good soil moisture and moisture of litter in surrounding communities will limit fire behaviour/intensity.
Regional ecosystems	Dominant: 12.3.1, 12.5.13, 12.8.3, 12.8.13, 12.9-10.16, 12.11.1, 12.11.10, 12.12.1, 12.12.16.
Conservation features	Very few scrub remnants remain; remnants are small and isolated. Habitat for rare and threatened flora and fauna. Remnants are threatened by weed invasion and fire on their margins. Natural regeneration should be encouraged to develop connectivity with other areas of remnant vegetation.

Wet sclerophyll upland and lowland forests

Land Resource Area	No Land Resource Area mapping is not available for this land type. Land Zone 11 and 12.
Landform	Low hilly, hilly to steep hilly terrain on shales and phyllites with narrow to open valleys.
Broad vegetation description	Wet tall open-forest on uplands and alluvium.
Native trees and shrubs	Overstorey of Brush box (Lophostemon confertus)(T), Tallowwood (Eucalyptus microcorys)(T), Gympie messmate (E. cloeziana)(T), Turpentine (Syncarpia glomulifera)(T), Satinay (S. hillii)(T), Flooded gum (E. grandis)(T), Sydney blue gum (E. saligna)(T), New England blackbutt (E. companulata)(T), Blue Mountains ash (E. oreades)(T), Grey gums (E. biturbinata, E. longirostrata)(T), Stringybark (E. resinifera)(T), Blackbutt (E. pilularis)(T) merging into vines and rainforest understory including Celery Wood (Polyscias elegans), Scentless rosewood (Synoum glandulosum), Poison peach (Trema tomentosa), Lilly pilly (Syzygium spp.), White cedar (Melia azedarach)(T), Red cedar (Toona ciliata)(T), Waddy wood (Trochocarpa laurina), Wattles (Acacia irrorata, A. melanoxylon), Bleeding heart (Homalanthus nutans), Macaranga (Macaranga tanarius), Native olive (Olea paniculata), Zamias (Macrozamia spp.) (T) = Suitable timber species – note conservation features over page
Pasture composition	**Denotes non native 'Expected Pasture Composition' species.*
Desirable pasture species	Rhodes grass*, Kangaroo grass, Paspalum*, Green panic grass*.
Intermediate pasture species	Couch grass*.
Undesirable pasture species	Blady grass.
Suitable sown pastures	Rhodes grass (Callide), Paspalum*, Green panic grass*. White clover, Glycine, Siratro.
Introduced weeds	Bracken fern, Blady grass, Groundsel bush, Lantana.

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Soil	
Description	Lithosols on shales and phyllites; Red podzolics. Very shallow soil overlying weathering rock or texture contrast soils of brown loamy sands (loose to hard setting, sometimes gravelly or very shallow) overlaying red or yellow well-structured clays.
Key properties	Plant available water capacity: Very low to low. Fertility: Lithosols – high. Podzolics – low. pH: Both surface and subsoils– strongly to slightly acid (5.2 to 6.8). Salinity: Very low to low. Sodicity: Non-sodic. Effective rooting depth <0.3 m (lithosols) to <1.5 m (podzolics).
Stocking rates	Native: Uncleared: 1 AE / 5 ha. Cleared: 1 AE / 3 ha. Improved pastures (dryland): 1 AE / 2 ha.
Common enterprise	Beef breeding and fattening, dairyng.
Land use and management recommendations	Suitable for grazing of native and improved pastures. Do not clear steep slopes or areas with very shallow soils. Maintain maximum surface cover at all times. Spell pastures when flowering and seeding. Burn (winter to spring) with a low to moderate intensity fire at about 20 year intervals. Needs disturbance to maintain ecosystem structure (eucalyptus species overstorey, rainforest dominated but mixed species understorey). It is unlikely that mosaic burns will be achievable because fire would most likely be of higher intensity (i.e. likely to be a wildfire) and is only likely to occur at long intervals (at least 20 years) during prolonged dry periods. In exceptional circumstances, different localities containing this ecosystem could be burnt to ensure a continuum of habitat availability across the broader landscape. Using this strategy maximises the probabilities of spatial mosaics in the landscape. Undertaking prescribed burning should only proceed with expert knowledge and caution.
Land use limitations	Highly erodible, with high risk of landslips on over-cleared steeper slopes. Prone to sheet erosion and wind erosion on bare, exposed slopes. Generally very low nutrient status, particularly nitrogen and phosphorus. Root development and nutrient uptake may be impeded in very shallow soils or more acid subsoils. Surface stone can be a problem. Red clays generally well drained, yellow clay subsoils poorly drained that can result in waterlogging after heavy rain.
Regional ecosystems	Dominant: 12.3.2, 12.5.6, 12.8.8, 12.8.9, 12.9-10.1, 12.11.2, 12.11.16, 12.12.15.
Conservation features	These wet sclerophyll forests are associated with high rainfall on elevated and fertile sites. They have been important sources of timber in the past. These forests are rich in biodiversity and provide vital corridors between the rainforest with which they are closely associated. These communities have outstanding fauna value, especially for arboreal hollow dwellers. Uplands areas are important in a bio-geographic sense with many species limited to these areas.

Tall open forests on steep hills and mountains

Land Resource Area	Principally Metamorphic hills (4). Also Volcanic peaks (3a). Land Zone 11.
Landform	Steep mountains and hills.
Broad vegetation description	Dry woodlands to open woodlands on undulating to low hilly terrain dominated by Spotted gum.
Native trees and shrubs	Grey gums (Eucalyptus propinqua, E. major)(T), White mahogany (E. acmenoides)(T), Blackbutt (E. pilularis)(T), Tallowwood (E. microcorys)(T), Spotted gum (Corymbia citriodora ssp. variegata)(T), Narrow-leaved ironbark (Eucalyptus crebra)(T) Broad- leaved ironbark (E. fibrosa ssp. fibrosa)(T), Smooth-barked apple (Angophora leiocarpa), Brown bloodwood (C. trachyphloia)(T). (T) = Suitable timber species – note conservation features over page.
Pasture composition	**Denotes non native 'Expected Pasture Composition' species.*
Desirable pasture species	Queensland bluegrass, Forest bluegrass, Kangaroo grass, Black spear grass, Barbed wire grass, Rhodes grass*, Creeping bluegrass*, Scented top, native legumes.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, bottlewasher grasses, love grasses, Barbed wire grass, Couch grass*, Native panic grass.
Undesirable pasture species	Wiregrasses, Reedgrasses, Blady grass, Slender chloris, Native rat's tail grass, Native lovegrass.
Legumes	Emu-foot, Woolly glycine, Rhynchosia, Creeping tick trefoil.
Suitable sown pastures	Not recommended in some situations. Rhodes grass, creeping blue grass. Shrubby stylo, fine stem stylo, Wynn cassia.
Introduced weeds	Lantana.

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Soil	
Description	Texture contrast soils of brown loamy sands (loose to hard setting, sometimes gravelly or very shallow) overlaying red or yellow well-structured clays; or very shallow soil overlying weathering rock.
Key properties	Plant available water capacity: Very low to low. Fertility: Lithosols – high. Podzolics – low. pH: Both surface and subsoils– strongly to slightly acid (5.2 to 6.8). Salinity: Very low to low. Sodicity: Non-sodic. Effective rooting depth <0.3 m (lithosols) to <1.5 m (podzolics).
Stocking rates	Native: Uncleared: 1 AE / 10 ha. Cleared: 1 AE / 5-6 ha. Improved pastures (dryland): 1 AE / 4 ha.
Utilisation	Conservative pasture utilisation: 25% by weight.
Enterprise	Cattle breeding and growing.
Land use and management recommendations	Suitable for grazing of native and improved pastures. Do not clear steep slopes or areas with very shallow soils. Maintain maximum surface cover at all times. Spell pastures when flowering and seeding. Burn (summer to winter) with a low to moderate intensity fire at 6-12 year intervals, with an occasional high intensity wildfire. Planned burning will assist in maintaining a diversity of understorey species. It is essential that wildfires are not the sole source of input of fire in this ecosystem. Needs disturbance to maintain Regional Ecosystem structure (eucalypt overstorey with open understorey of predominantly non-rainforest species).
Land use limitations	Highly erodible, with high risk of landslips on over-cleared steeper slopes. Prone to sheet erosion and wind erosion on bare, exposed slopes. Generally very low nutrient status, particularly nitrogen and phosphorus. Root development and nutrient uptake may be impeded in very shallow soils or more acid subsoils. Surface stone can be a problem. Red clays generally well drained, yellow clay subsoils poorly drained that can result in waterlogging after heavy rain.
Regional ecosystems	Dominant: 12.8.20, 12.8.25, 12.9-10.14, 12.12.15.
Conservation features	Habitat for rare and threatened flora including Persoonia spp. and cycads. When relatively uncleared, these land types provide valuable resources for forest dependent fauna such as possums, gliders, forest owls, microbats, insectivorous birds and arboreal and ground dwelling reptiles. Retaining adequate numbers of habitat trees is important in maintaining habitat for these species. Frequent fire regimes can reduce the shrubby understory.

Ironbark woodland/forest on granite

Land Resource Area	Granite hills (5). Land Zone 12.
Landform	Rolling hills and mountains.
Broad vegetation description	Dry to moist woodlands and open forests, mainly on undulating to hilly terrain of mainly acid volcanic rocks and some metamorphics; often on coarse, shallow, sandy soil.
Native trees and shrubs	Silver-leaved ironbark (Eucalyptus melanophloia), Narrow-leaved ironbark (E. crebra)(T), Grey ironbark (E. siderophloia)(T), Bloodwoods (Corymbia intermedia, C. trachyphloia), Wattles (Acacia spp.), Red ash (Alphitonia excelsa). (T) = Suitable timber species – note conservation features over page.
Pasture composition	* *Denotes non-native 'Expected Pasture Composition' species.*
Desirable pasture species	Rhodes grass*, Black spear grass, Kangaroo grass, Forest bluegrass, Scented top, Creeping bluegrass*, Native legumes.
Intermediate pasture species	Red natal grass*, Pitted bluegrass, Barbed wire grass, Tambookie grass, Native panic grass, Couch grass*.
Undesirable pasture species	Wire grasses, Blady grass, Slender chloris, Native rat's tail grass, Native lovegrass.
Suitable sown pastures	Rhodes grass (Callide & Katambora), Creeping bluegrass, Paspalum, Setaria in wetter areas, Fine stem style, Wynn cassia.
Introduced weeds	Lantana, Creeping Lantana, African lovegrass.
Soil	
Description	Deep sandy soils showing very little texture change with depth; or sandy loams overlying red or yellow strongly structured clays. Hard setting surface on earthy sands that still have usually high permeability.
Key properties	Plant available water capacity: Low. Fertility: Low. pH: Surface – 5.2 to 7.0. Subsoil – Podzolics acid (5.0 to 6.2). Earthy sands 7. Salinity: Very low. Sodicity: Non-sodic. Effective rooting depth: >1 m (Earthy Sands), <1.5 m (Podzolics).

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Stocking rates	Native pastures: Uncleared 1 AE / 8-9 ha; Cleared 1 AE / 5-6 ha; Improved 1 AE / 3-4 ha.
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Cattle breeding and stores.
Land use and management recommendations	Suitable for grazing of native and occasionally sown pastures. Timber reserves. Scattered areas of low slope and suitable soils will support horticulture and limited cropping. Maintain adequate surface cover at all times to reduce erosion. Spell pastures when flowering and seeding. Do not cultivate on slopes >8%.
Land use limitations	Plant available water capacity is low (even considering deep rooting depth). Nutrient status is low, especially phosphorus and nitrogen. Highly erodible on slopes if ground cover is inadequate. Hard setting soils inhibit seed germination, infiltration and increase runoff. Root development and nutrient uptake may be impeded in more acid subsoils. Burn every 3–6 years in summer to late autumn with a low intensity fire to help control weeds and regrowth (wattles, red ash). Aim to burn 30–60% of any given area. Spot ignition in cooler or moister periods encourages mosaics.
Regional ecosystems	Dominant: 12.12.12.
Conservation features	Extensively cleared for native pasture in some areas; relatively intact in others. These are generally grassy woodlands that provide habitat for larger marsupials. Hollow bearing habitat trees are important nesting sites for birds and arboreal mammals. Landscape health can be enhanced through appropriate fire regimes, grazing management and allowing regrowth to develop into effective wildlife corridors

Glossary

Acid soil	A soil giving an acid reaction throughout most or all of the soil profile. Generally speaking, when the pH drops below 5.5, the following specific problems may occur: aluminium toxicity, manganese toxicity, calcium deficiency, and/or molybdenum deficiency. These problems adversely affect plant growth and root nodulation which may result in a decline in plant cover and an increase in erosion hazard.
Acid sulfate soil (ASS)	Acid sulfate soil is the name given to soils and sediments containing iron sulfides, the most common being pyrite. When exposed to air due to drainage or disturbance, these soils produce sulfuric acid, often releasing toxic quantities of iron, aluminium and heavy metals. This can have major environmental, health, engineering, and economic effects. The term acid sulfate soil generally includes both actual (AASS) and potential acid sulfate soils (PASS), which often occur in the same soil profile. AASS usually overlie PASS. For more information, see: www.environment.gov.au/topics/water/water-information/acid-sulfate- soils/about-acid-sulfate-soils
Adult equivalent (AE)	The feed requirement of a 450 kg non-lactating beast.
Alkaline soil	A soil giving an alkaline reaction throughout most or all of the soil profile. Many alkaline soils have a high pH indicated by the presence of calcium carbonate, and are suitable for agriculture. However, others are problem soils because of salinity or sodicity. Soils with a pH above 9.5 are generally unsuitable for agriculture.
Alluvial plain	A plain formed by the accumulation of alluvium (see below) on a floodplain over a considerable period of time.
Alluvium	Deposits of gravel, sand, silt, clay or other debris, moved by streams from higher to lower ground.
Backplain	Large alluvial flat occurring some distance from the stream channel; often characterised by a high watertable and the presence of swamps or lakes
Clays	Soils with a uniform soil texture throughout the surface soil and subsoil. Clay soils may be 'cracking' (develop vertical cracks when dry) or 'non- cracking'.
Closed forest	A forest dominated by broad-leaved (sometimes narrow-leaved) trees with dense crowns that form a more or less continuous canopy.
Dispersion	The process whereby soils break down and separate into their constituent particles (clay, silt, sand) in water. Dispersible soils tend to be highly erodible and present problems for earth works. Dispersion is associated with sodicity levels.

Dry sclerophyll forest	A forest in which hard-leaved shrubs form a layer below the trees (usually species of eucalypts)(cf Wet sclerophyll forest).
Duplex soil	See Texture contrast soil.
Earths	Soils with a sandy to loamy (including clay loam) surface soil, gradually increasing to a loamy to light clay subsoil. Earths may be 'massive' (where the subsoil is not arranged into natural soil aggregates and appears as a coherent, or solid mass) or structured (where the subsoil is arranged into natural soil aggregates which can be clearly seen).
Effective rooting depth	The depth to which most plant feeder roots will penetrate. This is determined by the depth either to which salts have been leached and have therefore accumulated, or to an impeding layer.
Fertility	The capacity of the soil to provide adequate supplies of nutrients in proper balance for the growth of specified plants when other growth factors are favourable.
Forest	A plant community dominated by closely spaced trees with long trunks that have crowns mostly narrow and dense-foliaged and are separated from each other by an average distance equal 1 to 3 times the average crown width (cf. Woodland).
Gilgai	Surface microrelief associated with soils containing shrink-swell clays. Characterised by the presence of mounds and depressions.
Gradational	The term describes a soil with a gradual increase in texture (i.e. becomes more clayey) as the profile deepens.
Great Soil Group	Widely used system of soil classification in Australia depending on colour, texture, structure and consistence of the soil horizons present, and the nature of the horizon boundaries.
Gypsum	A naturally occurring soft crystalline material which is a hydrated form of calcium sulphate. Gypsum contains approximately 23% calcium and 18% sulphur. It is used to improve soil structure and reduce crusting in hard setting clayey soils.
Hardsetting	Surface soil that becomes hard and apparently structureless on the periodic drying of the soil.
Igneous rock	Rock crystallised from molten rock material (magma). It may be extruded to the Earth's surface (volcanic) or cool at variable depths below the surface (intrusive, and plutonic).
Krasnozems	A Great Soil Group consisting of red strongly structured clay soils. They have gradational texture profiles, with an acid to neutral reaction trend.
Land Resource Areas	Broad landscape units made up of groups of different soils developed from related geological units with recurring patterns of topography and vegetation.

Lithosols	A Great Soil Group consisting of shallow, stony or gravelly soils which are usually found on steep slopes.
Metamorphic rocks	Rocks that were originally igneous or sedimentary that have been physically and/or chemically altered by high temperatures and/or pressures beneath the Earth's surface.
Mottle	Spots, blotches or streaks of subdominant colours different from the main soil colour.
Open forest	A forest dominated by trees with relatively narrow leaves forming sparsely foliaged crowns (usually species of eucalypts). The forest canopy is sparse and often not continuous allowing sunlight to reach the ground within the forest (cf Closed forest).
Pan	A hard and/or cemented soil horizon e.g. cultivation pan.
Permeability	The capacity for transmission under gravity of water through soil or sediments.
Plant available water capacity	The quantity of water held in a soil that can be extracted by plant roots. It is expressed as millimetres of plant available water within the root zone (PAWC).
pH	A measure of acidity or alkalinity. A pH of 7.0 indicates neutrality. Higher values indicate alkalinity and lower values indicate acidity. Soil pH affects the amount of different nutrients that are soluble in water and therefore the amount of nutrient available to plants.
Podzolics	A Great Soil Group consisting of texture contrast soils with distinct bleached subsurface horizons overlying subsoils which have higher clay contents and iron and manganese deposits. These soils have an acid reaction trend.
Potential acid sulfate soils (PASS)	Acid sulfate soils are not always a problem. Under the anaerobic reducing conditions maintained by permanent groundwater, the iron sulfides are stable and the surrounding soil pH is often weakly acid to weakly alkaline. Such soils are called potential acid sulfate soils (PASS) as they have potential to produce sulfuric acid when disturbed or exposed to air. Potential acid sulfate soils: • often have a pH close to neutral (6.5–7.5) • contain unoxidised iron sulfides • are usually soft, sticky and saturated with water • are usually gel-like muds but can include wet sands and gravels • have the potential to produce acid if exposed to oxygen

Prairie soils	A Great Soil Group consisting of soils with thick, dark A horizons, mildly acid to mildly alkaline trend, and soil depths generally less than one metre.
Regional Ecosystem (RE)	A classification scheme which identifies vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. REs are identified by a three part code, where the first part refers to the geographic bioregion (12 = South East Queensland), the second part refers to the land zone on which the regional ecosystem occurs, and the third part refers to the vegetation type. For more information, see: www.ehp.qld.gov.au/ecosystems/biodiversity/re_introduction.html
Rendzinas	A Great Soil Group consisting of shallow to very shallow soils formed from limestone. They are dark coloured clay loams or light clays with a neutral to alkaline reaction trend.
Riparian lands	That part of the landscape adjacent to streams which exert a direct influence on streams or lake margins and on the water and aquatic ecosystems contained within them includes both the steam banks and the adjacent land.
Salinity	The presence of sufficient soluble salts to adversely affect plant growth and/or land use. The main salt involved is sodium chloride, but sulfates, carbonates and magnesium salts occur in some soils.
Sands	Soils with a uniform sand (including sandy loam) texture throughout the surface soil and subsoil.
Sedimentary rocks	Rocks formed by the accumulation of material which has been weathered and eroded from pre-existing rocks, then transported and deposited as sediment by wind or water.
Self-mulching	A condition of well-structured surface soil, notably of clays, in which the aggregates fall apart naturally as the soil dries to form a loose mulch of soil aggregates. In cultivated soils, ploughing when wet may appear to destroy the surface mulch which, however, will re-form upon drying.
Snuffy	Soils with an A horizon having a very fine granular structure and a dry consistence strength that is weak to very weak. The horizon usually has a low bulk density and may be water repellent.
Sodicity	A characteristic of soils (usually subsoils) containing exchangeable sodium to the extent of adversely affecting soil stability, plant growth and/or land use.
Soil horizon	A layer of soil material within the soil profile with distinct characteristics and properties produced by soil forming processes, and which are different from those of the layers above and or below. The three main horizons are: A (topsoil), B (subsoil), C (layer(s) below the B horizon which may be weathered parent material, not bedrock, little affected by soil-forming processes.

Soil profile	A vertical cross-sectional exposure of a soil, from the surface to the parent material.
Soil reaction trend	The general direction of the change in pH with depth.
Soil structure	The arrangement of natural soil aggregates that occur in soil; structure includes the distinctness, size and shape of these aggregates.
Soil texture	The coarseness or fineness of soil material as it affects the behaviour of a moist ball of soil when pressed between the thumb and forefinger. It is generally related to the proportion of clay, silt and sand within a soil.
Solodic soils	Soils with strong texture contrasts between A horizons and sodic B horizons which are not strongly acid
Subsoil	Soil layers below the surface with one of the following attributes: a larger content of clay, iron, aluminium, organic material (or several of these) than the surface and subsurface soil; stronger colours than those of the surface and subsurface soil above, or the substrate below. The B horizon.
Subsurface soil	Soil layers immediately under the surface soil which usually have less organic matter, paler colours and may have less clay than the surface soil. The A2 horizon.
Surface crust	Distinct surface layer, often laminated, ranging in thickness from a few millimetres to a few tens of millimetres, which is hard and brittle when dry and cannot be readily separated from and lifted off the underlying soil material.
Surface soil	The soil layer extending from the soil surface down which has some organic matter accumulation and is darker in colour than the underlying soil layers. The A horizon.
Texture contrast soil	A soil in which there is a sharp change in soil texture between the A and B horizons (surface and subsoil) over a distance of 10 cm or less. Also known as a duplex soil.
Volcanic rocks	Igneous rocks which have cooled from magma extruded to the Earth's surface. The size of the rock crystals depends on its duration of cooling - rapid cooling forms very fine crystals or even volcanic glass.
Wet sclerophyll forest	An open forest in which soft-leaved shrubs form a layer below the trees (usually species of eucalypts)(cf. Dry sclerophyll forest).
Woodland	A plant community dominated by trees with short trunks (usually species of eucalypts) that are separated from each other by an average distance equal to 3 to several times the average crown width. There is usually a well-developed understory of either grasses and other herbs, sedges or hard-leaved shrubs (cf. Forest).

Regional Ecosystems in the Sunshine Coast Catchments

RE	Short Description
12.1.1	Casuarina glauca open forest on margins of marine clay plains
12.1.2	Saltpan vegetation including grassland and herbland on marine clay plains
12.1.3	Mangrove shrubland to low closed forest on marine clay plains and estuaries
12.2.1	Notophyll vine forest on parabolic high dunes
12.2.3	Araucarian vine forest on parabolic high dunes
12.2.4	Syncarpia hillii, Lophostemon confertus tall open to closed forest on parabolic high dunes
12.2.5	Corymbia spp., Banksia integrifolia, Callitris columellaris, Acacia spp. open forest to low closed forest on beach ridges in southern half of bioregion
12.2.6	Eucalyptus racemosa woodland on dunes and sand plains. Deeply leached soils
12.2.7	Melaleuca quinquenervia or M. viridiflora open forest to woodland on sand plains
12.2.8	Eucalyptus pilularis open forest on parabolic high dunes
12.2.9	Banksia aemula woodland on dunes and sand plains. Deeply leached soils
12.2.11	Corymbia spp., Eucalyptus spp., Acacia spp. open forest to low closed forest on beach ridges in northern half of bioregion
12.2.12	Closed heath on seasonally waterlogged sand plains
12.2.13	Open heath on sand plains and dunes
12.2.14	Foredune complex
12.2.15	Swamps with Baumea spp., Juncus spp. and Lepironia articulata
12.2.16	Sand blows largely devoid of vegetation
12.3.1	Gallery rainforest (notophyll vine forest) on alluvial plains
12.3.2	Eucalyptus grandis tall open forest on alluvial plains
12.3.4	Melaleuca quinquenervia, Eucalyptus robusta open forest on or near coastal alluvial plains
12.3.5	Melaleuca quinquenervia tall open forest on coastal alluvial plains

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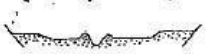
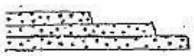
12.3.6	*Melaleuca quinquenervia, Eucalyptus tereticornis, Lophostemon suaveolens* woodland on coastal alluvial plains
12.3.8	Swamps with *Cyperus* spp., *Schoenoplectus* spp. and *Eleocharis* spp.
12.3.11	*Eucalyptus siderophloia, E. tereticornis, Corymbia intermedia* open forest on alluvial plains near coast
12.3.13	Closed heathland on seasonally waterlogged alluvial plains near coast
12.3.14	*Banksia aemula* woodland on alluvial plains near coast
12.5.2	*Eucalyptus tereticornis, Corymbia intermedia* on remnant Tertiary surfaces, usually near coast. Usually deep red soils
12.5.3	*Eucalyptus tindaliae* and/or *E. racemosa* open forest on remnant Tertiary surfaces
12.5.4	*Eucalyptus* spp., *Corymbia* spp., *Melaleuca* spp. woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks
12.5.6	*Eucalyptus siderophloia, E. propinqua, E. microcorys* and/or *E. pilularis* tall open forest on remnant Tertiary surfaces. Usually deep red soils
12.5.9	Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rocks
12.5.10	*Banksia aemula* woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks
12.5.12	*Eucalyptus racemosa, E. latisinensis* ± *Corymbia gummifera, C. intermedia, E. bancroftii* woodland with heathy understorey on remnant Tertiary surfaces
12.5.13	Microphyll to notophyll vine forest ± *Araucaria cunninghamii* on remnant Tertiary surfaces
12.8.3	Complex notophyll vine forest on Cainozoic igneous rocks. Altitude <600m
12.8.8	*Eucalyptus saligna* or *E. grandis* tall open forest on Cainozoic igneous rocks
12.8.9	*Lophostemon confertus* tall open forest on Cainozoic igneous rocks
12.8.13	Araucarian complex microphyll vine forest on Cainozoic igneous rocks
12.8.14	*Eucalyptus eugenioides*, *E. biturbinata, E. melliodora* open forest on Cainozoic igneous rocks
12.8.19	Montane shrubland on Cainozoic igneous rocks
12.8.20	Shrubby woodland with *Eucalyptus racemosa* or *E. dura* on Cainozoic igneous rocks
12.8.25	Open forest with *Eucalyptus acmenoides* or *E. helidonica* on Cainozoic igneous rocks especially trachyte
12.9-10.1	Tall shrubby open forest often with *Eucalyptus resinifera, E. grandis, Corymbia intermedia* on sedimentary rocks. Coastal
12.9-10.4	*Eucalyptus racemosa* woodland on sedimentary rocks
12.9-10.7	*Eucalyptus crebra* woodland on sedimentary rocks

12.9-10.9	Shrubland/low woodland on sandstone lithosols
12.9-10.14	*Eucalyptus pilularis* tall open forest on sedimentary rocks
12.9-10.16	Araucarian microphyll to notophyll vine forest on sedimentary rocks
12.9-10.17	Open forest complex often with *Eucalyptus acmenoides, E. major, E. siderophloia* ± *Corymbia citriodora* on sedimentary rocks
12.9-10.22	Closed sedgeland/shrubland on sedimentary rocks. Coastal parts
12.11.1	Simple notophyll vine forest often with abundant *Archontophoenix cunninghamiana* (gully vine forest) on metamorphics ± interbedded volcanics
12.11.2	*Eucalyptus saligna* or *E. grandis, E. microcorys, E. acmenoides, Lophostemon confertus* tall open forest on metamorphics ± interbedded volcanics
12.11.3	Tall open forest generally with *Eucalyptus siderophloia, E. propinqua* on metamorphics ± interbedded volcanics
12.11.5	Tall open forest complex with *Corymbia citriodora, Eucalyptus siderophloia, E. major* on metamorphics ± interbedded volcanics
12.11.10	Notophyll vine forest ± *Araucaria cunninghamii* on metamorphics ± interbedded volcanics
12.11.14	*Eucalyptus crebra, E. tereticornis* woodland on metamorphics ± interbedded volcanics
12.11.16	Tall open forest with *Eucalyptus cloeziana* on metamorphics ± interbedded volcanics
12.12.1	Simple notophyll vine forest usually with abundant *Archontophoenix cunninghamiana* (gully vine forest) on Mesozoic to Proterozoic igneous rocks
12.12.2	*Eucalyptus pilularis* tall open forest on Mesozoic to Proterozoic igneous rocks especially granite
12.12.10	Shrubland of rocky peaks on Mesozoic to Proterozoic igneous rocks
12.12.12	*Eucalyptus tereticornis, E. crebra* or *E. siderophloia, Lophostemon suaveolens* open forest on granite
12.12.14	Shrubby woodland of rocky near coastal areas on Mesozoic to Proterozoic igneous rocks
12.12.15	*Eucalyptus siderophloia, E. propinqua, E. acmenoides* tall open forest on near coastal hills on Mesozoic to Proterozoic igneous rocks
12.12.16	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks
12.12.19	Vegetation complex of rocky headlands, predominantly but not exclusively on Mesozoic to Proterozoic igneous rocks
12.12.23	*Eucalyptus tereticornis* ± *E. eugenioides* woodland on crests, upper slopes and elevated valleys on Mesozoic to Proterozoic igneous rocks

Land zones

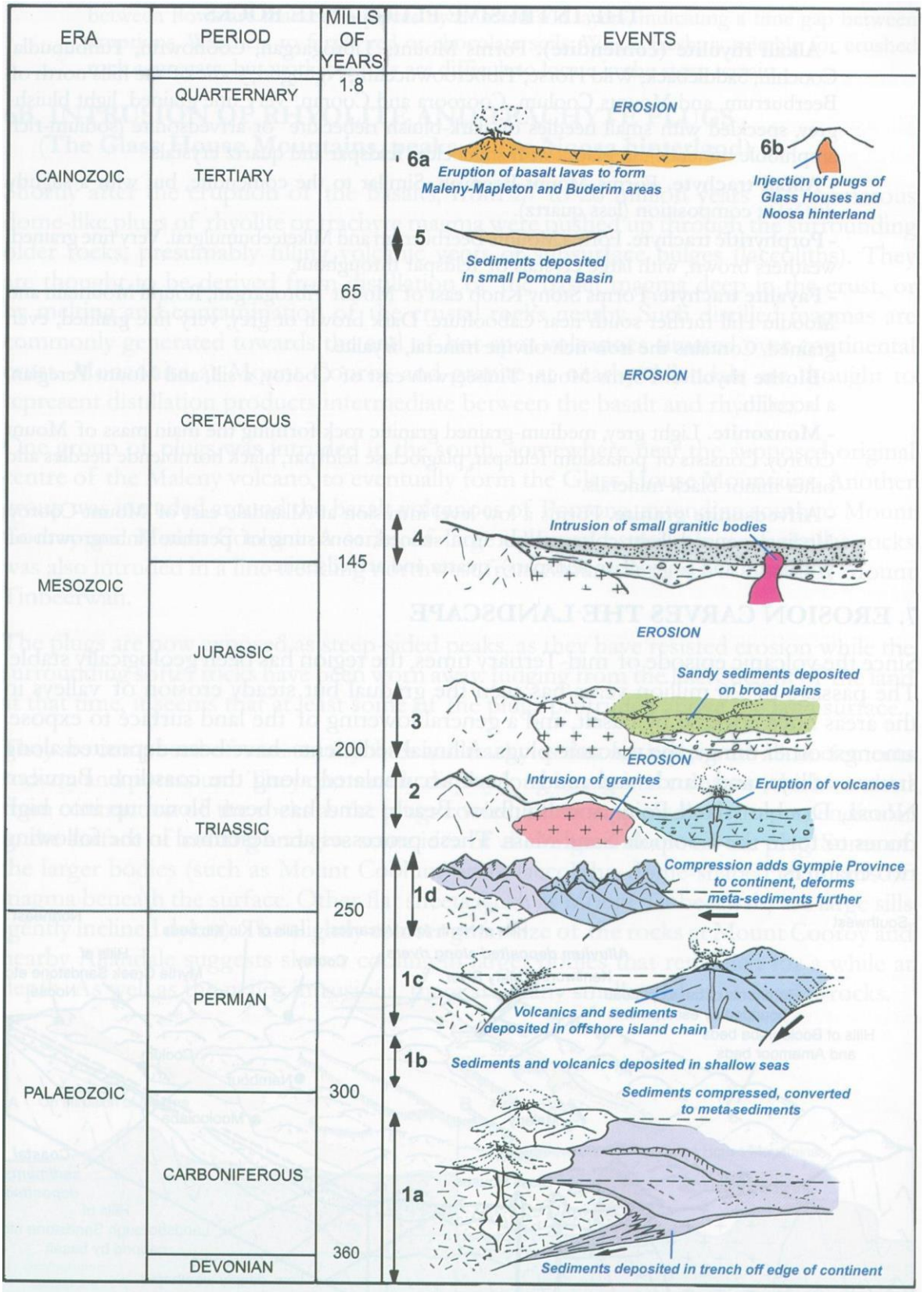
The second part of the regional ecosystem classification, and associated number, refers to the land zone in which the regional ecosystem occurs. The land zone is a simplified geology/substrate landform classification for Queensland. The twelve different land zones in Queensland are listed in the following table.

Land Zones of Southeast Queensland (Bioregion 12)

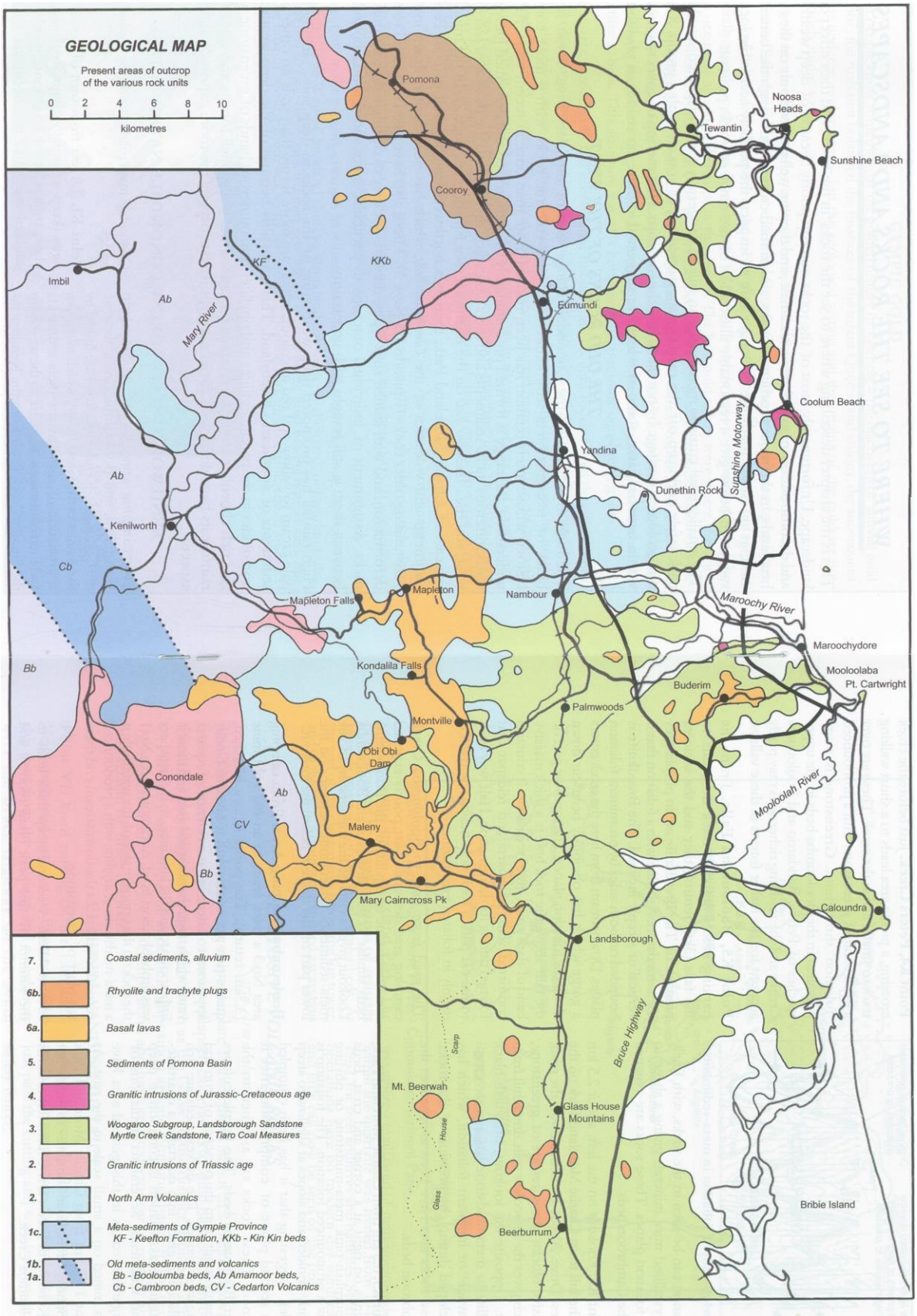
Land zone number - central concept	Land zone definition (lay terminilogy)
1. - deposits subject to periodic tidal inundation 	Quaternary estuarine and marine deposits subject to periodic inundation by saline or brackish marine waters. Includes mangroves, saltpans, off-shore tidal flats and tidal beaches. Soils are predominantly Hydrosols (saline muds, clays and sands) or beach sand. **(tidal flats and beaches)**
2. - Quaternary coastal sand deposits 	Quaternary coastal dunes and beach ridges. Includes degraded dunes, sand plains and swales, lakes and swamps enclosed by dunes, as well as coral and sand cays. Soils are predominantly Rudosols and Tenosols (siliceous or calcareous sands), Podosols and Organosols. **(coastal dunes).**
3. - Quaternary alluvial systems 	Quaternary alluvial systems, including floodplains, alluvial plains, alluvial fans, terraces, levees, swamps, channels, closed depressions and fine textured palaeo-estuarine deposits. Also includes estuarine plains currently under fresh water influence, inland lakes and associated dune systems (lunettes). Excludes talus slopes, colluvial deposits and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols, also with Hydrosols in higher rainfall areas. **(alluvium, river and creek flats)**
4. - clay plain	Clay plains and Sporadic hills on alluvium
5. - plains and plateaus on Tertiary land surfaces, generally with medium to coarse textured soils 	Extensive, uniform near level or gently undulating Cainozoic plains with sandy or loamy soils. Includes dissected remnants of these surfaces. Also includes plains with sandy or loamy soils of uncertain origin, and plateau remnants with deep soils usually overlying duricrust. Excludes Quaternary alluvial deposits (land zone 3), exposed duricrust (land zone 7), and soils derived from underlying bedrock (land zones 8 to 12).Soils are usually Tenosols and Kandosols, also minor deep sandy surfaced Sodosols and Chromosols. There may be a duricrust at depth. SYMBOLS INDICATING DEEP WEATHERING **(old loamy and sandy plains)**
6. - Sedimentary and duricrusts	Tableland remnants
7. - exposed or shallowly covered duricrusts 	Cainozoic duricrusts formed on a variety of rock types, usually forming mesas or scarps. Includes exposed ferruginous, siliceous or mottled horizons and associated talus and colluvium, and remnants of these features, for example low stony rises on downs. Soils are usually shallow Rudosols and Tenosols, with minor Sodosols and Chromosols on associated pediments, and shallow Kandosols on plateau margins and larger mesas. **(ironstone jump-ups)**
8. - plains and hills on Cainozoic flood basalts 	Cainozoic igneous rocks, predominantly flood basalts forming extensive plains and occasional low scarps. Also includes hills, cones and plugs on trachytes and rhyolites, and associated interbedded sediments, and talus. Excludes springs (land zone 3), and deep soils overlying duricrust (land zone 5). Soils include Vertosols, Ferrosols, and shallow Dermosols. **(basalt plains and hills)**
9/10.	**Land zone 9 and land zone 10 are combined in SEQ.**
9. - generally undulating landscapes on more or less horizontally bedded fine grained sedimentary rocks 	Fine-grained sedimentary rocks, generally with little or no deformation, forming undulating landscapes with a broad range of fine textured soils of moderate to high fertility. Siltstones, mudstones, shales, calcareous sediments, and lithic and labile sandstones are typical rock types although minor interbedded volcanics may occur. Excludes areas of duricrust (land zone 7). Includes a diverse range of soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols. **(undulating country on fine grained sedimentary rocks)**
10. - plateaus, scarps and ledges with shallow soils on more or less horizontally bedded medium to coarse grained sedimentary rocks 	Medium to coarse-grained sedimentary rocks, with little or no deformation, forming plateaus, ledges and scarps. Includes siliceous sandstones, conglomerates and minor interbedded volcanics, and springs associated with these rocks. Excludes overlying Cainozoic sand deposits (land zone 5). Soils are predominantly shallow Rudosols and Tenosols of low fertility, but include sandy surfaced Kandosols, Kurosols, Sodosols and Chromosols. **(sandstone ranges)**
11. - hills and lowlands on metamorphosed sedimentary rocks 	Metamorphosed rocks, forming ranges, hills and lowlands. Primarily lower Permian and older sedimentary formations which are generally moderately to strongly deformed. Includes low- to high-grade and contact metamorphics such as phyllites, slates, gneisses of indeterminate origin and serpentinite, and interbedded volcanics. Soils are mainly shallow, gravelly Rudosols and Tenosols, with Sodosols and Chromosols on lower slopes and gently undulating areas. Soils are typically of low to moderate fertility. **(hills and lowlands on metamorphosed rocks)**
12. - hills and lowlands on granitic and other pre Cainozoic igneous rocks 	Mesozoic to Proterozoic igneous rocks, forming ranges, hills and lowlands. Predominantly granitic rocks and intermediate to acid volcanics such as granites, granodiorites, andesites and rhyolites, as well as minor areas of associated interbedded sediments and basic intrusive rock types such as gabbros and dolerites. Excludes serpentinites (land zone 11) and younger igneous rocks (land zone 8). Soils are mainly Tenosols and Rudosols on steeper slopes with Chromosols and Sodosols on lower slopes and gently undulating areas. Soils are typically of low to moderate fertility. **(hills and lowlands on granitic rocks)**

and Type Information Sheets

Geological Time Scale and Geology Map



Geological time scale, and timing of events in the Sunshine Coast and Gympie districts.



Source: Willmott, WF. (2007) Rocks and Landscapes of the Sunshine Coast. Geological Society of Australia, Queensland Division.

More Information

Property Management Planning

Property Management Planning (PMP) is a process for landholders to analyse their farming enterprise from a bio-physical, ecological, economic and social perspective and to formulate a well-rounded plan that takes into account factors such as vegetation management, soil conservation, nature conservation, land and water management and pest management.

Healthy Land & Water arranges a variety of workshops and field days to provide landholders with the latest information on sustainable land management practices.

Some of Healthy Land & Waters intensive workshops come with additional information such as Geographic Information Systems and satellite imagery to assist landholders to develop a holistic plan to ensure long term farm sustainability.

Key to Eucalypts of Greater Brisbane

The Queensland Herbarium has produced a user friendly guide to identifying native trees and shrubs found in the South East Queensland region, visit the Queensland Government website www.qld.gov.au

Regional Ecosystems

To search the Regional Ecosystem database or to find an explanation of land zones and the fields in RE descriptions, visit the Queensland Government website www.qld.gov.au

Websites

Healthy Land & Water www.hlw.org.au

Queensland Government www.qld.gov.au

Sunshine Coast Council www.sunshinecoast.qld.gov.au

Noosa Council www.noosa.qld.gov.au

Queensland Fire and Biodiversity Consortium www.fireandbiodiversity.org.au/

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- Regional Ecosystems
- Weeds, Pest Animals and Ants
- Acid Sulfate Soils