Healthy Land & Water

# South East Queensland Land Types Booklet – Gold 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)
- Gold Coast City 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 qualified extension office.

# 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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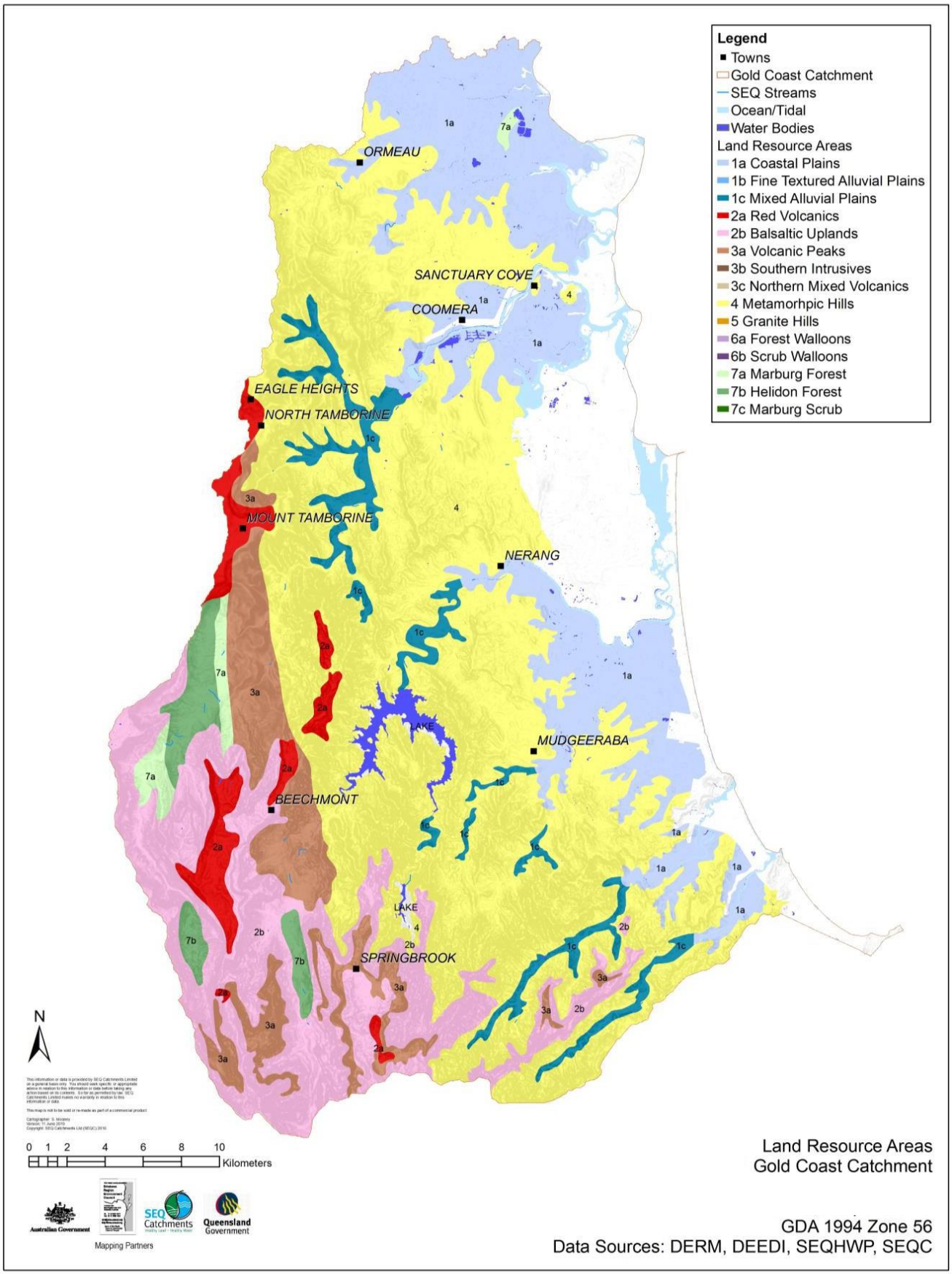
# Land Resource Areas of the Gold Coast Catchments







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# Blue gum on alluvial plains

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| **Land Resource Area** | Fine textured alluvial plains (1b). |
| **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).<br>(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.<br>Lucerne, Siratro, Burgundy bean, clovers, medics and Lotononis (coastal). |
| **Introduced weeds** | Chinese celtis, Lantana, Green cestrum, Annual ragweed, Blue heliotrope, Lippia, Fireweed. |



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| **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.<br>Fertility: Medium to high.<br>pH: Surface – Variable (6 to 8). More alkaline in subsoil.<br>Salinity: Very low.<br>Sodicity: Non-sodic. Cracking clays occasionally sodic at depths > 0.6 m.<br>Effective rooting depth >1.2 m for loams and >1.5 m for cracking clays. |
| **Stocking rates** | Cleared native pastures: 1 AE / 3 ha.<br>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.<br>Soils are suitable for most grain, fodder and small crops.<br>A coordinated drainage strategy of subsurface drains, diversion banks and crop layout design is required in intensively developed areas.<br>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.<br>Maintain adequate surface cover at all times in areas used for grazing.<br>Spell pastures when flowering and seeding.<br>Control declared and environmental weeds.<br>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.<br>Alluvial loams become cloddy after cultivation and may become hard setting if compacted by continual cropping.<br>Local frosts and flooding may occur. Erosive flooding may be a high risk in some locations. Surface runoff may be high, particularly following irrigation.<br>Overland flow may cause rill and sheet erosion on unprotected surfaces.<br>Stream banks are susceptible to erosion. |
| **Regional ecosystems** | 12.3.3 (dominant); 12.3.7 (others) |
| **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.<br>Freshwater wetlands which are important for biodiversity & ecosystem function are associated with this land type.<br>Large, mature blue gums containing hollows are important nesting sites and habitat for a variety of birds and marsupials.<br>Regrowth regenerates rapidly in the absence of grazing and frequent fire. |

# Coastal heathlands

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| **Land Resource Area** | Coastal plains (1a). |
| **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.<br>Fertility: Low.<br>Erodability: Low. |
| **Enterprise** | Livestock should be excluded from these heathlands. |
| **Land use and management recommendations** | Native species should not be supplemented with introduced species. |
| **Land use limitations** | 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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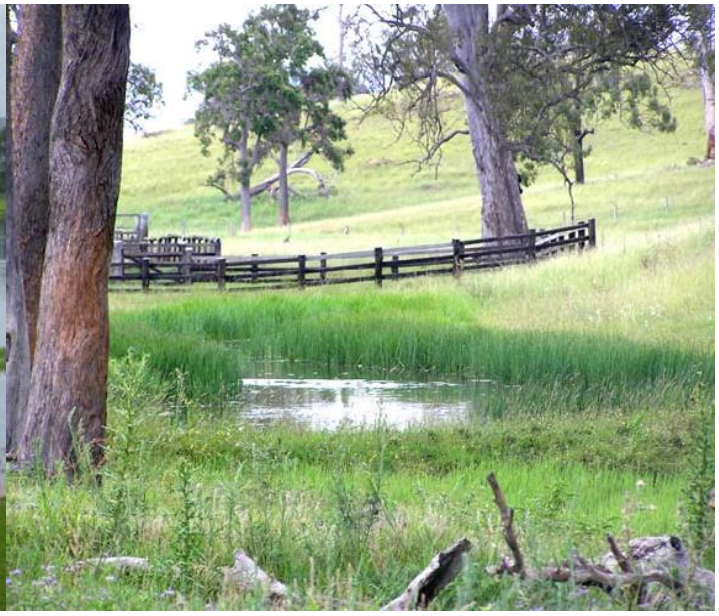
| **Regional ecosystems** | Dominant: 12.2.9, 12.2.12, 12.2.15, 12.3.13, 12.3.14 |
| **Conservation features** | These heathlands occur principally on the Sunshine Coast and sand mass islands, with a naturally restricted extent on the mainland south of Noosa. They are one of the communities included under the common name 'wallum'. |

# Grass-sedge wetlands



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| **Land Resource Area** | Principally coastal plains (1a), fine textured alluvial plains (1b) and mixed alluvial plains (1c). |
| **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.<br>(T) = Suitable timber species |
| **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<br>Fertility: Medium.<br>Salinity: Non-saline (except in marine areas)<br>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.<br>Native pasture species should not be supplemented with introduced species.<br>Exclude fire. |

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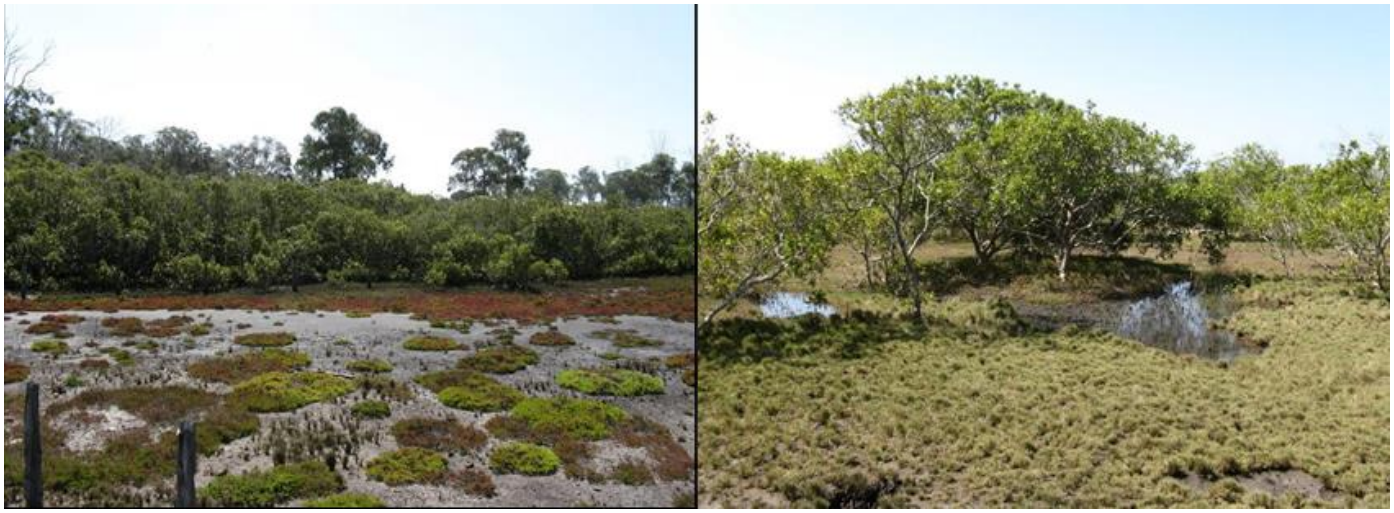
| **Land use limitations** | These wetlands become waterlogged after rain and are seasonally inundated. |
| **Regional ecosystems** | Dominant 12.3.8 |
| **Conservation features** | Many areas of this wetland type have not been mapped due to their small size. Changes to water flows, particularly the 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.<br>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.<br>Pigs may be a management issue. |

# Mangroves and salt marshes



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| **Land Resource Area** | Coastal plains (1a). |
| **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.<br>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. |
| **Regional ecosystems** | Dominant: 12.1.3 |

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| **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.<br>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.<br>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.<br>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.<br>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.<br>Pigs can cause extensive damage. |

# Paperbark forests on coastal plains

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| **Land Resource Area** | Coastal plains (1a). |
| **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).<br>(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.<br>*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. |
| **Soil** | |



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| 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.<br>Fertility: Variable, but commonly low.<br>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.<br>Subject to weed invasion, especially groundsel which may form dense stands.<br>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.<br>Pastures: With drainage and fertilizer, these soils are suitable for establishment of improved pastures.<br>Fertilizer applications of N and P are generally required for crop and pasture production.<br>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).<br>Soil surface tends to crust which reduces infiltration and creates poor soil-seed contact.<br>Chemical toxicities (especially aluminium and manganese) may be a problem where these soils are strongly acid.<br>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 |

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| **Conservation features** | These forests play a critical role in the hydrological regime of the coastal plain.<br>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.<br>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. |

# Rainforest (closed forest) on basalts

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| **Land Resource Area** | Principally Red volcanics (2a). Also Basaltic uplands (2b). |
| **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).<br>(T) = Suitable timber species – note conservation features over page. |
| **Pasture composition** | No native pastures in uncleared rainforest. Some naturalised paspalum and mat grass and minimal grassy understorey after clearing.<br>**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 grass, Prairie grass, Kikuyu, Paspalum, Green panic grass, Setaria. White clover, Glycine, Siratro, Leucaena, White clover, glycine, siratro. |
| **Introduced weeds** | African boxthorn, privet, lantana, bracken fern, blady grass, wild tobacco, Crofton weed, fireweed. |



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| **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 to 0.8 m. |
| Key properties | Plant available water capacity: High. Low in shallow soils.<br>Fertility: Medium to high.<br>pH: Krasnozems: Surface – acid (5.5 to 6.5). Subsoil – more acid (4.8 to 6.0)<br>Prairie soils: Surface – slightly acid (6.5). Subsoil – strongly alkaline (8.5)<br>Salinity: Low to very low.<br>Sodicity: Non-sodic.<br>Effective rooting depth <0.8 m (prairie) to >1.5 m (krasnozems). |
| **Stocking rates** | Cleared native pastures: 1 AE / 3-4 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.<br>Maintain maximum surface cover to maintain soil structure and reduce erosion.<br>Avoid trafficking and cultivation when wet to reduce soil compaction.<br>Rotate intensively cultivated crops with broadacre field crops and legumes to improve soil structure and fertility.<br>Periods under pasture rotation are recommended to enhance long-term soil stability and soil organic matter content.<br>Regular additions of fertiliser are required to maintain productivity. Lime application required on average every 3-5 years.<br>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.<br>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. 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** | Surface structure becomes cloddy and hard setting under cultivation; plough pans may develop.<br>Effective rooting depth limited by very strongly acid subsoils.<br>Fertility is variable and declines rapidly under development.<br>Highly erodible on cultivated slopes >3% (krasnozems).<br>Prairie soils are moderate to high erosion risk, particularly on steeper slopes.<br>Shallow soils often stony and <0.5 m above weathered bedrock.<br>Landslip risk in some areas (Mt Tamborine, Beechmont, Running Creek) |
| **Regional ecosystems** | 12.8.3, 12.8.4, 12.8.5. |
| **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.<br>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 the genetic vigour of species that make up and inhabit these rainforests. |

# Riparian forests

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| **Land Resource Area** | Fine textured alluvial plains (1b). Also mixed alluvial plains (1c) and coastal plains (1a). |
| **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 deposits adjacent to streams of sandy loams through to clay. |
| Key properties | Plant available water capacity: Medium to high.<br>Fertility: Medium to high.<br>Salinity: Very low.<br>Sodicity: Non-sodic.<br>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.<br>Maintain groundcover cover and minimise erosion.<br>Where Chinese celtis is a problem, adopt short periods of high intensity grazing in combination with other weed control methods.<br>Access to streams by livestock should be avoided or carefully managed.<br>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, 12.3.7. Others represented: 12.3.3. |
| **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.<br>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.<br>Catchment management activities are aimed at conserving and restoring riparian forests to enable functioning corridors and the maintenance of essential habitat and water quality.<br>Feral pigs can cause extensive damage. |

# Tall open forests on basalts

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| **Land Resource Area** | Red volcanics (2a), basaltic uplands (2b). |
| **Landform** | Mainly on plateaus, but also occurs undulating rises to rolling low hills (slopes 3 - 40%). |
| **Broad vegetation description** | Moist to dry open forests to woodlands mainly on basalt areas. |
| **Native trees and shrubs** | Brush box *(Lophostemon confertus)* (T), Tallowwood *(Eucalyptus microcorys)* (T), Rose gum *(E. grandis)* (T), Sydney blue gum *(E. saligna)* (T), Grey ironbark *(E. siderophloia)* (T), Grey gums *(E. biturbinata, E. propinqua, E. major, E. longirostrata)* (T), Thin-leaved stringybark *(Eucalyptus eugenioides)* (T), Red stringybark *(E. resinifera)* (T), White mahogany *(E. acmenoides)* (T), Bat wing coral tree *(Erythrina vespertilio)*.<br>(T) = Suitable timber species – note conservation features over page. |
| **Pasture composition** | **Denotes non-native 'Expected Pasture Composition' species.* |
| Desirable pasture species | Queensland blue, forest blue, kangaroo, black spear, Rhodes, scented top, kikuyu*, paspalum*, green panic*, Tambookie grass. |
| Intermediate pasture species | Umbrella grass, Spring grass, Slender bamboo grass, Liverseed grass*, Pitted bluegrass, Barbed wire grass, Couch grass*. |
| Undesirable pasture species | Wiregrasses, Blady grass, Slender chloris. |
| Legumes | Glycine pea, Woolly glycine, Rhynchosia, Creeping tick trefoil. |
| **Suitable sown pastures** | Rhodes, kikuyu, paspalum, green panic, creeping bluegrass. White clover, glycine, siratro, Leuceana. |
| **Introduced weeds** | Lantana, wild tobacco tree, privet, fireweed, giant rat's tail grass. |

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| **Soil** | |
| Description | Deep, (often > 5m) red, strongly structured clays that are friable and highly permeable. Occurrences also on shallow, dark friable clay loams and clays over weathered parent rock. Shallower soils have bedrock at 0.3 to 0.8 m. |
| Key properties | Plant available water capacity: High. Low in shallow soils.<br>Fertility: Medium to high.<br>pH: Krasnozems: Surface – acid (5.5 to 6.5). Subsoil – more acid (4.8 to 6.0)<br>Prairie soils: Surface – slightly acid (6.5). Subsoil – strongly alkaline (8.5)<br>Salinity: Low to very low.<br>Sodicity: Non sodic.<br>Effective rooting depth <0.8 m (prairie) to >1.5 m (krasnozems). |
| **Stocking rates** | Cleared native pastures: 1 AE / 3 ha.<br>Improved pastures (dryland): 1 AE / 2 ha. |
| **Utilisation** | Conservative pasture utilisation: 30% by weight. |
| **Enterprise** | Cattle growing and fattening. |
| **Land use and management recommendations** | Suitable for grazing of improved pastures, dryland and irrigated cropping.<br>Maintain maximum surface cover to maintain soil structure and reduce erosion.<br>Avoid trafficking and cultivation when wet to reduce soil compaction.<br>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.<br>Regular additions of fertiliser are required to maintain productivity. Lime application required on average every 3-5 years.<br>Adopt practices such as minimum tillage, stubble mulching, and weed control to maintain soil structure and reduce erosion on sloping lands. Do not cultivate on slopes greater than 10-15%.<br>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 RE structure (eucalypt overstorey with open understorey of predominantly non-rainforest species). 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** | Surface structure becomes cloddy and hard setting under cultivation; plough pans may develop.<br>Effective rooting depth limited by very strongly acid subsoils. Fertility is variable and declines rapidly after development.<br>Highly erodible on cultivated slopes >3% (krasnozems).<br>Prairie soils have moderate to high erosion risk, particularly on steeper slopes.<br>Shallow soils often stony and <0.5 m above weathered bedrock.<br>Landslip risk in some areas (Mt Tamborine, Beechmont, Springbrook). |
| **Regional ecosystems** | Dominant: 12.8.8, 12.8.14<br>Others represented: 12.3.2, 12.8.2, 12.8.9, 12.8.11 |
| **Conservation features** | These are wet sclerophyll forests and have been important sources of timber in the past. They are associated with high rainfall on elevated and fertile sites. These forests are rich in biodiversity and provide vital corridors between the rainforest with which they are closely associated. They 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. There are also many associated springs that allow for a diverse variety of fauna to exist in these areas. |

# Tall open forests on steep hills and mountains

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| **Land Resource Area** | Principally Metamorphic hills (4). Also Volcanic peaks (3a). |
| **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.<br>Fertility: Lithosols – high. Podzolics – low.<br>pH: Both surface and subsoils– strongly to slightly acid (5.2 to 6.8).<br>Salinity: Very low to low.<br>Sodicity: Non-sodic.<br>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.<br>Do not clear steep slopes or areas with very shallow soils. Maintain maximum surface cover at all times.<br>Spell pastures when flowering and seeding.<br>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). 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** | Highly erodible, with high risk of landslips on over-cleared steeper slopes. Prone to sheet erosion and wind erosion on bare, exposed slopes.<br>Generally very low nutrient status, particularly nitrogen and phosphorus.<br>Root development and nutrient uptake may be impeded in very shallow soils or more acid subsoils.<br>Surface stone can be a problem.<br>Red clays generally well drained, yellow clay subsoils poorly drained that can result in waterlogging after heavy rain. |
| **Regional ecosystems** | Dominant: 12.8.1, 12.8.20, 12.8.24, 12.8.25, 12.11.23.<br>Others: 12.9-10.14, 12.11.9, 12.12.3, 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. |

# Wet sclerophyll upland and lowland forests

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| **Land Resource Area** | No Land Resource. Area mapping is not available for this land type. |
| **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.)<br>(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.<br>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.<br>Fertility: Lithosols – high. Podzolics – low.<br>pH: Both surface and subsoils– strongly to slightly acid (5.2 to 6.8).<br>Salinity: Very low to low.<br>Sodicity: Non-sodic.<br>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.<br>Do not clear steep slopes or areas with very shallow soils. Maintain maximum surface cover at all times.<br>Spell pastures when flowering and seeding.<br>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.<br>Always communicate with your local Rural Fire Brigade regarding planned burns.<br>Refer to the SEQ Fire and Biodiversity Consortium for more information: www.fireandbiodiversity.org.au. |
| **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.<br>Generally very low nutrient status, particularly nitrogen and phosphorus.<br>Root development and nutrient uptake may be impeded in very shallow soils or more acid subsoils.<br>Surface stone can be a problem.<br>Red clays generally well drained, yellow clay subsoils poorly drained that can result in waterlogging after heavy rain. |
| **Regional ecosystems** | Dominant: 12.3.2, 12.8.1, 12.8.2, 12.8.8, 12.8.9, 12.11.2, 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.<br>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. |

# Glossary

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| **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.<br>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 for 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 flats 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 slerophyll forest) |

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| **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. |



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| **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.<br>Potential acid sulfate soils:<br>• often have a pH close to neutral (6.5–7.5)<br>• contain unoxidised iron sulfides<br>• are usually soft, sticky and saturated with water<br>• are usually gel-like muds but can include wet sands and gravels<br>• 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** | A classification scheme which identifies vegetation communities in a bioregion |

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| **Ecosystem (RE)** | 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. |

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| **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). |



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# Regional Ecosystems in the Mid Brisbane Catchment

| RE | Short Description |
|---|---|
| 12.3.3 | Eucalyptus tereticornis woodland to open forest on alluvial plains |
| 12.3.7 | Eucalyptus tereticornis, Melaleuca viminalis, Casuarina cunninghamiana fringing forest |
| 12.3.8 | Swamps with Cyperus spp., Schoenoplectus spp. and Eleocharis spp. |
| 12.5.1 | Open forest complex with Corymbia citriodora on subcoastal remnant Tertiary surfaces. Usually deep red soils |
| 12.5.2 | Eucalyptus tereticornis, Corymbia intermedia on remnant Tertiary surfaces, usually near coast. Usually deep red soils |
| 12.8.8 | Eucalyptus saligna or E. grandis tall open forest on Cainozoic igneous rocks |
| 12.8.13 | Araucarian complex microphyll vine forest on Cainozoic igneous rocks |
| 12.8.17 | Eucalyptus crebra, E. melanophloia woodland on Cainozoic igneous rocks |
| 12.9-10.2 | Corymbia citriodora, Eucalyptus crebra open forest on sedimentary rocks |
| 12.9-10.3 | Eucalyptus moluccana on sedimentary rocks |
| 12.9-10.6 | Acacia harpophylla open forest on sedimentary rocks |
| 12.9-10.7 | Eucalyptus crebra woodland on sedimentary rocks |
| 12.9-10.8 | Eucalyptus melanophloia, E. crebra woodland 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 |
| 12.11.1 | 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 |
| 12.11.6 | Corymbia citriodora, Eucalyptus crebra open forest on metamorphics ± interbedded volcanics |
| 12.11.8 | Eucalyptus melanophloia, E. crebra woodland on metamorphics ± interbedded volcanics |
| 12.11.10 | Notophyll vine forest ± Araucaria cunninghamii on metamorphics ± interbedded volcanics |



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12.11.11 *Araucarian microphyll* vine forest on metamorphics ± interbedded volcanics; southern half of bioregion

12.11.13 Semi-evergreen vine thicket on metamorphics ± interbedded volcanics; northern half of bioregion

12.11.14 *Eucalyptus crebra, E. tereticornis* woodland on metamorphics ± interbedded volcanics

12.11.18 *Eucalyptus moluccana* tall open forest 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"

12.12.5 *Corymbia citriodora*, *Eucalyptus crebra* open forest on Mesozoic to Proterozoic igneous rocks

12.12.7 *Eucalyptus crebra* woodland on Mesozoic to Proterozoic igneous rocks

12.12.8 *Eucalyptus melanophloia* woodland 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

12.12.23 *Eucalyptus tereticornis* ± *E. eugenioides* woodland on crests, upper slopes and elevated valleys on Mesozoic to Proterozoic igneous rocks

# 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.http://www.qld.gov.augov.au

Gold Coast City Council www.goldcoast.qld.gov.au

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



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Queensland Government www.qld.gov.au

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