

South East Queensland Land Types

Booklet – Brisbane Valley

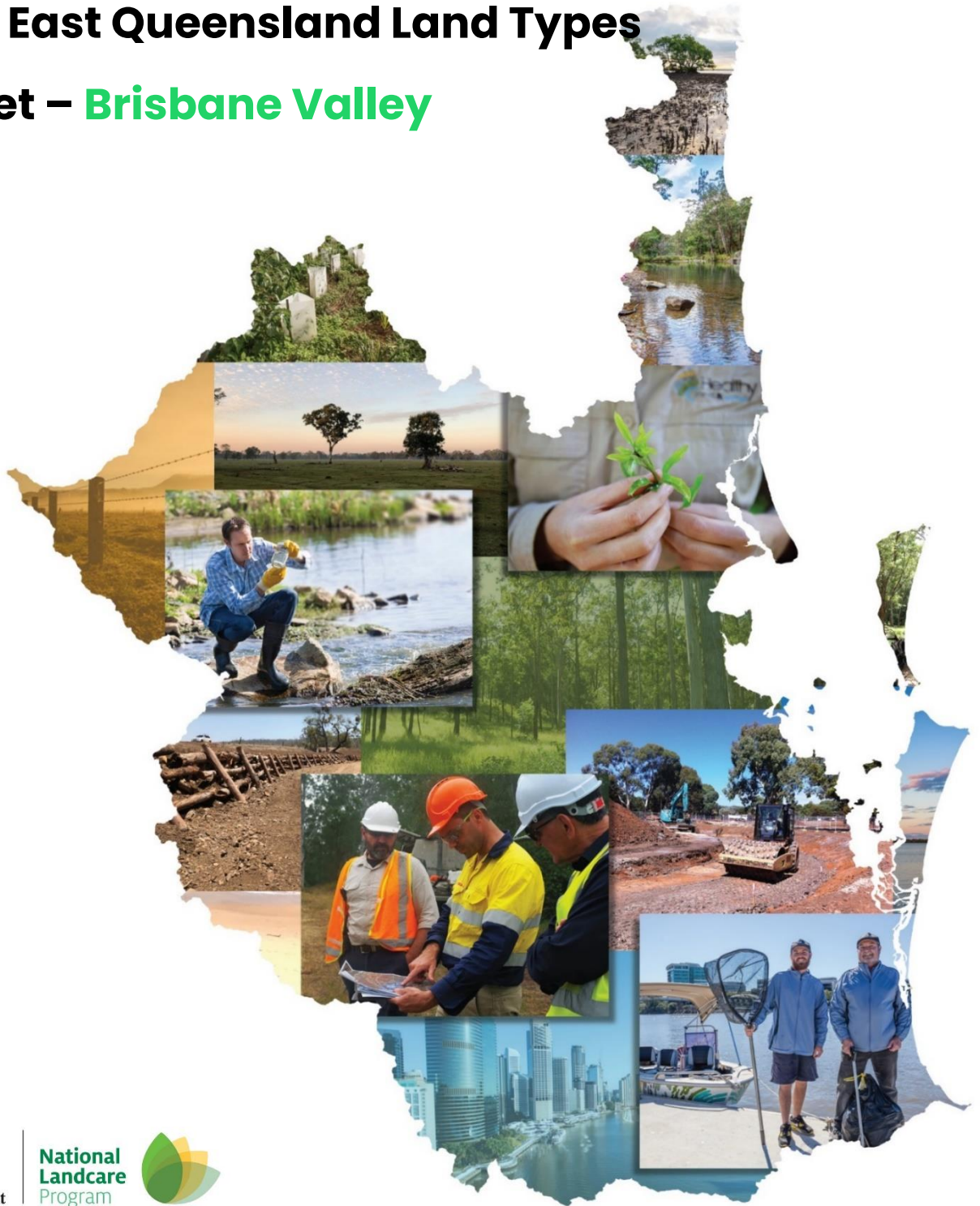


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- Somerset Regional Council
- Queensland Fire and Biodiversity Consortium (QFBC)

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.

Disclaimer

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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 land use 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 (Page 9) 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.
- **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.
- **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 2.
- **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 officers

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 its land use capability and limitations.**
- **Work cooperatively with neighbours for effective management of landscape scale issues** such as fire management, weeds, animal pests and erosion.
- **Ensure appropriate placement and maintenance of infrastructure** (for example roads, bridges, fences, yards and water points) to minimise land degradation.
- **Protect and rehabilitate areas that are degraded or at risk from erosion and salinity** through fencing and re-establishment of groundcover and native vegetation.
- **Control and minimise the spread of declared weeds and pests**, and environmental weeds.
- **Respect and protect indigenous and European cultural heritage sites.**
- **Minimise energy use and waste** to reduce costs and environmental impacts.
- **Maintain high levels of groundcover (>90%)** at all times of the year to prevent erosion and to maintain productive capacity and water quality.



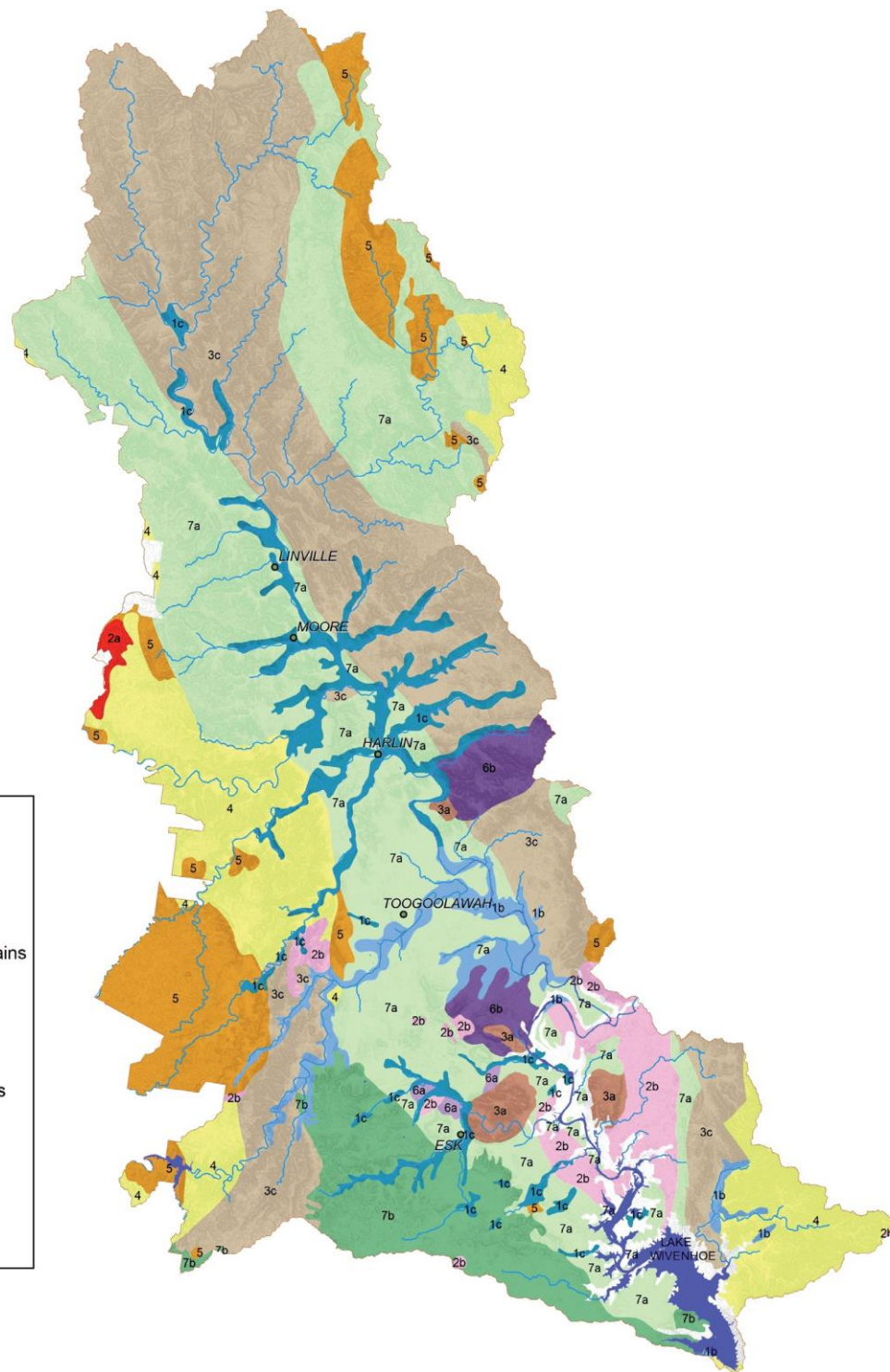
- **Adopt grazing management practices which maintain healthy diverse pastures** dominated by 3P (Perennial, Productive, Palatable) species and stable soils and which incorporate spelling or rest at appropriate times to enable pastures to recover and set seed.
- **Monitor and manage pastures** to match stocking rates with pasture availability.
- **Adopt sustainable cropping practices** (eg reduced tillage, stubble retention and use of legumes and crop rotations) to prevent soil health decline, soil acidification and erosion.
- **Implement irrigation and farming practices which improve water use efficiency** and deep drainage while minimising nutrient losses and run off.
- **Protect and manage remnant vegetation and regrowth** representing the original vegetation communities on your property.
- **Retain all large standing trees with hollows**, whether alive or dead, and organic litter and fallen timber as critical habitat for a range of invertebrates, reptiles, birds and small mammals.
- **Improve connectivity between patches of native vegetation** through natural regeneration and strategic revegetation.
- **Restore the condition of native vegetation through strategic fencing, fire management, ecological**



thinning and weed control.

- **Ensure your fire management plan and the fire** regime (frequency, extent, intensity and timing) you implement **considers the ecological requirements** of each vegetation type on your property.
- **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.
- **Creeks, rivers, springs and wetlands** are often the keystone ecosystems in the landscape and **need to be buffered from adjoining land use** and protected from the impacts of channel modification, altered flow regimes, weeds and pests, fire, and unmanaged grazing.
- **Protect and enhance native riparian vegetation** to minimise streambank erosion, filter nutrients, provide habitat, maintain healthy aquatic functions and protect water quality.
- **Manage dams as artificial wetlands** by strategic fencing and establishment of alternative watering points and providing vegetative buffers by encouraging regeneration and revegetation.
- **Leave snags and large woody debris in streams** to provide habitat and control erosion.

Land Resource Areas of the Brisbane Valley



Legend

- Towns
- Brisbane Valley Catchment
- SEQ Streams
- Land Resource Areas
- 1a Coastal Plains
- 1b Fine Textured Alluvial Plains
- 1c Mixed Alluvial Plains
- 2a Red Volcanics
- 2b Basaltic Uplands
- 3a Volcanic Peaks
- 3b Southern Intrusives
- 3c Northern Mixed Volcanics
- 4 Metamorphic Hills
- 5 Granite Hills
- 6a Forest Walloons
- 6b Scrub Walloons
- 7a Marburg Forest
- 7b Helidon Forest
- 7c Marburg Scrub



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Mapping Partners

Land Resource Areas
Brisbane Valley Catchment

1:325,000 printed A3
GDA 1994 Zone 56

Data Sources: DERM, DEEDI, SEQHWP, SEQC



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Land Type Information Sheets

Riparian forests



Land Resource Area	Fine textured alluvial plains (1b). Also mixed alluvial plains (1c).
Landform	Occur along the bed and banks including terraces of rivers, creeks and watercourses where sufficient 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 (<i>Melaleuca viminalis</i>), Black tea-tree (<i>M.bracteata</i>), River she-oak (<i>Casuarina cunninghamiana</i>), Queensland blue gum (<i>Eucalyptus tereticornis</i>) (T), Broad-leaved apple (<i>Angophora subvelutina</i>), Silky oak (<i>Grevillea robusta</i>) (T), Brush cherry (<i>Syzygium australe</i>), Weeping lilly pilli (<i>Waterhousia floribunda</i>), Native elm (<i>Aphananthe philippinensis</i>), Red kamala (<i>Mallotus philippensis</i>), Black bean (<i>Castanospermum australe</i>)(T), White cedar (<i>Melia azedarach</i>)(T), Sandpaper fig (<i>Ficus coronata</i>), Native frangipani (<i>Hymenosporum flavum</i>), Red cedar (<i>Toona ciliata</i>)(T), Blackwood (<i>Acacia melanoxylon</i>)(T), Maiden's wattle (<i>A.maidenii</i>), Hickory wattle (<i>A.disparrima</i>). (T) = Suitable timber species.
Other associated native species	Mat rush (<i>Lomandra longifolia</i> , <i>L. hystrix</i>), Blueberry lily (<i>Dianella caerulea</i>), Cockspur thorn (<i>Maclura cochinchinensis</i>).
Regional ecosystems	Main: 12.3.7. Others: 12.3.3, 12.3.1.
Pasture composition	
Desirable pasture species	Kangaroo grass, Queensland bluegrass, Black speargrass, Forest bluegrass, Swamp rice grass, Water couch, Paspalum, Pangola grass, Kikuyu, Panic.
Intermediate pasture species	Pitted bluegrass, Barbwire grass, Couch grass, Native panic.

Undesirable pasture species	Wiregrass, Blady grass, Swamp foxtail, Slender chloris, Native rat's tail grass.
Suitable sown pastures	Not recommended.
Introduced weeds	Chinese celtis, cats claw creeper, Madeira vine, balloon vine, climbing asparagus, camphor laurel, mulberry, lantana.
Soil	Alluvial loams, Alluvial red-brown earths, Alluvial black earths.
Description	Alluvial deposits adjacent to streams of sandy loams through to clay.
Key properties	Plant available water capacity: Medium Medium (Loams, Red-brown earths) to High (Black earths). Fertility: Medium to high for all nutrients. N levels lower in Loams, Red-brown earths. Salinity: Very low. Sodicity: Non-sodic. Effective rooting depth: >1 m for Loams, Red-brown earths, >1.5 m for Black earths.
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 to manage grazing pressure to allow protection of existing vegetation, encourage regeneration and manage exotic weeds. Similarly livestock access to streams needs to be managed to prevent erosion and damage to sensitive aquatic habitats. Maintain groundcover cover and aim for dominance of perennial tussock grasses to minimise erosion. Where environmental weeds like Chinese celtis are a problem, adopt short periods of high intensity grazing in combination with other weed control methods. Avoid intentionally burning this fringe vegetation – riparian vegetation is susceptible to fire. Burn surrounding ecosystems in conditions that minimise fire incursion. Care needs to be taken with the placement of infrastructure such as crossings, roads, drainage works from adjacent floodplains and fences to avoid damage to native vegetation and to minimise erosion. Feral pigs can cause extensive damage.
Land use limitations	Soils are often highly erodible and susceptible to flooding.

<p>Conservation features</p>	<p>Riparian forests occur along streams forming an intricate network extending across different landscapes from upland areas through to broad alluvial floodplains. 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.</p> <p>Riparian forests and associated geomorphic habitats of boulder beds and gorges through to bars, pools and riffle sequences support a plethora of essential habitat for many terrestrial and aquatic species including stream frogs, platypus, fish nurseries and macro- invertebrates, many of which are rare or threatened.</p> <p>Riparian areas are sometimes referred to as “keystone ecosystems” – that is the health of the surrounding landscape is highly dependant on their condition and function.</p> <p>Catchment management activities are aimed at conserving and restoring riparian forests to protect and enhance habitat and corridor functionality, stabilise streambeds and banks and trap and process nutrients to maintain water quality.</p>
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Grass-sedge wetlands



<p>Land Resource Area</p>	<p>Fine textured alluvial plains (1b) and mixed alluvial plains (1c).</p>
<p>Landform</p>	<p>Billabongs and depressions in alluvial plains, especially backplains and old channels.</p>
<p>Broad vegetation description</p>	<p>Freshwater wetlands seasonally dominated by grasses and sedges.</p>
<p>Native trees and shrubs</p>	<p>Queensland blue gum (<i>Eucalyptus tereticornis</i>)(T), Swamp mahogany (<i>Lophostemon suaveolens</i>), Creek apple (<i>Angophora subvelutina</i>) around edges. (T) = Suitable timber species</p>

Other associated native species	Sedges (<i>Cyperus</i> spp.), Clubrushes (<i>Schoenoplectus</i> spp.), <i>Eleocharis</i> spp., Common reed (<i>Phragmites australis</i>), Cumbungi (<i>Typha</i> spp.), Water snowflakes (<i>Nymphoides indica</i>), Smartweeds and knotweeds (<i>Persicaria</i> spp.), Nardoo (<i>Marsilea mutica</i>), Water ribbons (<i>Triglochin procerum</i>).
Regional ecosystems	12.3.8
Native and naturalized grasses	Water couch (<i>Paspalum distichum</i>), Swamp ricegrass (<i>Leersia hexandra</i>), Hairy jointgrass (<i>Arthraxon hispidus</i>), <i>Ischaemum</i> spp., <i>Chloris</i> spp., <i>Paspalum</i> , Swamp foxtail (<i>Pennisetum alopecuroides</i>).
Suitable sown pastures	It is not recommended that any pasture species be sown in these wetlands.
Introduced weeds	Lippia, Water primrose, Para grass, Water hyacinth burrs and thistles.
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.
Land use and management recommendations	Livestock should be excluded from these wetlands during wet periods and when native species are flowering and setting seed. Native pasture species should not be supplemented with introduced species. Exclude fire from these freshwater and ephemeral wetlands. Mature trees should be retained and regeneration of key overstorey species such as Queensland blue gum, Creek apple and Swamp mahogany encouraged.
Land use limitations	These wetlands become waterlogged after rain and are seasonally inundated.
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 (eg 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 waterbirds, tortoises and frogs and freshwater invertebrates and are particularly important as refugia during dry conditions. These sensitive areas are susceptible to damage from feral pigs and deer and require management of these pest animals for their protection.

Blue gum woodland on alluvial plains



Land Resource Area	Fine textured alluvial plains (1b), mixed alluvial plains (1c).
Landform	Flat to gently undulating alluvial plains, levees and terraces (0–3% slope) along rivers and creeks draining mixed volcanics, sediments and some metamorphics. Freshwater wetlands may occur.
Occurrence	Hollows and flats along watercourses, and floodplains and terraces along Brisbane River and main tributaries.
Broad vegetation description	Remnants of Queensland blue gum woodland with a grassy understorey. Also Swamp mahogany, Moreton Bay ash, Ironbarks and Gum topped box and Broad-leaved Apple.

Native trees and shrubs	Queensland blue gum (<i>Eucalyptus tereticornis</i>) (T), Broad-leaved apple (<i>Angophora subvelutina</i>), Swamp box (<i>Lophostemon suaveolens</i>), Moreton Bay ash (<i>Corymbia tessellaris</i>), Narrow-leaved ironbark (<i>E.crebra</i>) (T), Silver-leaved ironbark (<i>E.melanophloia</i>), Gum-topped box (<i>E.moluccana</i>) (T), Maiden's wattle (<i>Acacia maidenii</i>), Hickory wattle (<i>A. disparrima</i>), Black tea-tree (<i>Melaleuca bracteata</i>), River sheoak (<i>Casuarina cunninghamiana</i>), Silky oak (<i>Grevillea robusta</i>). (T) = Suitable timber species - note conservation features over page.
Regional ecosystems	12.3.3 (main); 12.3.7 (others)
Pasture composition	
Desirable pasture species	Queensland bluegrass, Forest bluegrass, Kangaroo grass, Black speargrass, Scented top, native legumes, Rhodes grass, Creeping bluegrass, Paspalum, Pangola grass.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Couch grass, Native panic.
Undesirable pasture species	Wire grass, Blady grass, Swamp foxtail, Native rat's tail grass.
Suitable sown pastures	Rhodes grass (<i>Callide</i>), Creeping bluegrass, Pangola, Paspalum, Kikuyu, Setaria, Panic, Lucerne, Siratro, Burgundy bean, Clovers, Medics, Lotononis, Leucaena.
Introduced weeds	Chinese celtis, Lantana, Green cestrum, Annual ragweed, Blue heliotrope, Lippia.
Soil	Black earths, Alluvial loams, Prairie soils, Red-brown earths.
Description	Dominantly deep, dark grey to dark brown cracking clays on alluvial flats (Black earths) or free draining loamy soils associated with watercourses (Alluvial loams, Prairie soils). Some areas of brown loamy surface soils over reddish-brown subsoils on flats (Red-brown earths). 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 / 4 ha. Improved pastures: 1 AE / 2 ha.
Utilisation	Conservative pasture utilisation: 35% by weight.
Enterprise	Predominantly cropping; fattening on native and improved pastures.

<p>Land use and management recommendations</p>	<p>Extensively developed for agriculture, including wide range of dryland and irrigated crops and pastures. Soils are suitable for most grain, fodder and small crops. Coordinated drainage strategy of subsurface drains, diversion banks and crop layout design is required in intensively developed areas.</p> <p>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.</p> <p>Maintain adequate surface cover at all times (>90%) in areas used for grazing. Routinely spell pastures to allow seed to set and to improve vigour, resilience and dominance of desirable species.</p> <p>Burn with a low intensity fire in spring to late autumn every 3 to 6 years. Aim to burn 40% to 60% of any given area and encourage mosaics using spot ignition in cooler or moister periods. Burn only with sufficient soil moisture to maintain pasture, soil and habitat values.</p>
<p>Land use limitations</p>	<p>Slow drainage, particularly black earths with high clay content, may cause waterlogging and restrict growth of some crops.</p> <p>Alluvial loams and Red-brown earths may become cloddy after cultivation and may become hard-setting if compacted by continual cropping.</p> <p>Local frosts and flooding may occur. Erosive flooding may be a high risk in some locations. Surface runoff may be high, particularly following irrigation.</p> <p>Overland flow may cause rill and sheet erosion on unprotected surfaces. Stream banks are susceptible to erosion.</p> <p>Soil structural problems and plough pans may develop if cropped continuously.</p>
<p>Conservation features</p>	<p>While Queensland blue gum is common, blue gum communities have been extensively cleared and fragmented. As an Endangered regional ecosystem (RE 12.3.3), intact remnants and regrowth areas have high conservation significance.</p> <p>Freshwater wetlands, which are important for biodiversity and ecosystem function, are associated with this land type.</p> <p>Large, mature blue gums containing hollows are important nesting sites and habitat for a variety of birds, reptiles and mammals.</p> <p>Regrowth regenerates rapidly in the absence of grazing and frequent fire.</p>

Blue gum and Gum-topped box on alluvial plains



Land Resource Area	Mixed alluvial plains (1c)
Landform	Alluvial plains and terraces derived from a variety of sedimentary, metamorphic, granitic and volcanic rocks.
Occurrence	Floodplains along Brisbane River, creek flats and drainage lines.
Broad vegetation description	Grassy open forest to woodland of Queensland blue gum and Gum-topped box.
Native trees and shrubs	<p>Queensland blue gum (<i>Eucalyptus tereticornis</i>)(T), Gum-topped box (<i>E.moluccana</i>)(T), Broad-leaved apple (<i>Angophora subvelutina</i>), Swamp box (<i>Lophostemon suaveolens</i>), Moreton Bay ash (<i>Corymbia tessellaris</i>), Narrow-leaved ironbark (<i>E.crebra</i>)(T), Silver-leaved ironbark (<i>E.melanophloia</i>), Maiden's wattle (<i>Acacia maidenii</i>), Hickory wattle (<i>A.disparima</i>), Black tea-tree (<i>Melaleuca bracteata</i>), River sheoak (<i>Casuarina cunninghamiana</i>), Silky oak (<i>Grevillea robusta</i>).</p> <p>Sometimes found with softwood scrub species e.g. Red kamala (<i>Mallotus philippensis</i>), Foambark (<i>Jagera pseudorhus</i>), Bitter bark (<i>Alstonia constricta</i>), White cedar (<i>Melia azedarach</i>), Chain fruit (<i>Alyxia ruscifolia</i>).</p> <p>Also associated with the endangered Swamp tea-tree (<i>Melaleuca irbyana</i>) as an understory on grey clays in southern part of the valley.</p> <p>(T) = Suitable timber species - note conservation features over page.</p>
Regional ecosystems	Main: 12.9-10.3, 12.9-10.11. Others: 12.3.3
Pasture composition	
Desirable pasture species	Queensland bluegrass, Forest bluegrass, Kangaroo grass, Black speargrass, Scented top, Rhodes grass, Creeping bluegrass, Paspalum, native legumes.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Couch grass, Native panic.
Undesirable pasture species	Wire grasses, Blady grass, Swamp foxtail grass, Native rat's tail grass.
Suitable sown pastures	Rhodes (Callide), creeping blue, Floren blue, pangola, paspalum, kikuyu, setaria, panic, Lucerne, siratro, burgundy bean, clovers, medics, lotononis, Leucaena*.
Introduced weeds	Chinese celtis, lantana, green cestrum, annual ragweed, blue heliotrope, lippia.
Soil	Coarse structured clays, Alluvial loams, Solodics, Soloths.
Description	Deep dark brown to dark grey cracking clays (Coarse structured clays), or loamy sand to clay loam (Alluvial loams) and texture contrast soils (Solodics, Soloths). Usually gilgai development is present, and a thick bleached zone occurs above the hard clays in duplex soils.
Limitations	Surface soils of Solodics and Soloths are commonly hard setting. Highly salinity below 0.5 m (Coarse structured clays, Solodics). Strongly sodic and dispersible subsoils (Coarse clays, Solodics, Soloths). If strongly acid, chemical toxicities (Al, Mg) may be a problem and indicate increased dispersibility.

Key properties	<p>Plant available water: High – Coarse clays and loams. Very Low – Soloths, Solodics.</p> <p>Fertility: Medium–High (Loams), Low–Medium (Coarse clays, Solodics), Very low (Soloths).</p> <p>pH: Both surface and subsoil – variable: Surface – 4.5 to 7.7; Subsoil – 4.2 to 8.5.</p> <p>Salinity: Very low to low at surface; medium to high salinity at depths >50 cm.</p> <p>Sodicity: Non-sodic; strongly sodic at depths >50 cm.</p> <p>Effective rooting depth: <0.4 m (Soloths, solodics) and <0.6 m (Clays) to >1.2 m (Loams)</p>
Stocking rates	<p>Native pastures: Uncleared 1 AE/8 ha; Cleared: 1 AE/4–5 ha.</p> <p>Improved pastures: 1 AE/2–3 ha.</p>
Utilisation	<p>Conservative pasture utilisation: 30% by weight.</p>
Enterprise	<p>Breeding and fattening.</p>
Land use and management recommendations	<p>Suitable for grazing of native and improved pastures, managed native forest and plantations. Maintain maximum surface cover (>90%) at all times of the year. Shallow duplex soils are not suitable for agricultural development. In better drained areas, short-term forage crops may be grown.</p> <p>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.</p> <p>Planned burn of low–moderate intensity at intervals of 3 to 7 years from spring to winter. Variable fire regimes should maintain a mosaic of grassy and shrubby understoreys. Burn with soil moisture and aim to burn 40–60% burn using spot ignition strategy so that a patchwork of burnt/unburnt is achieved.</p>
Land use limitations	<p>Poor to very poor drainage causes waterlogging after rain, particularly in soils with high clay content, with some areas seasonally inundated.</p> <p>Moderate to high risk of sheet and gully erosion on cracking clays on sloping sites. Texture contrast soils are very susceptible to sheet, tunnel and gully erosion.</p> <p>Effective rooting depth reduced by poor drainage, high subsoil salinity and sodicity. Plant growth limited by very tough, poorly structured subsoil and hard setting surfaces of duplex soils.</p> <p>Saline seepages may occur in lower slope positions.</p>
Conservation features	<p>These woodlands and forests are important habitat for a variety of reptiles, birds and arboreal and ground dwelling mammals including koalas, possums, gliders, phascogales, kangaroos, wallabies, bettongs and bandicoots.</p> <p>They provide important corridors through the landscape for both resident and dispersing fauna.</p> <p>Frequent fires reduce the shrubby understorey, but variable fire regimes encourage mosaics. Heavy grazing reduces fuel loads and exposes the soil surface to erosion.</p>

Ironbarks and Blue gum woodlands on clays



Land Resource Area	Principally Basaltic uplands (2b), and Scrub walloons (6b) and also Northern mixed volcanics (3c).
Landform	Undulating hills and rises associated with Neara Volcanics and Esk Formation.
Occurrence	Undulating to hilly country around Somerset Dam, Crossdale and Bryden (2b), Gregors Creek, Coal Creek and Mt Beppo districts (6b) and Moore to Pine View and patches from Linville to Head of the River (3c).
Broad vegetation description	Queensland blue gum, silvered-leaved and narrow-leaved ironbark dry woodlands to open woodlands on rolling volcanic hills and rises.
Native trees and shrubs	Silver-leaved ironbark (<i>Eucalyptus melanophloia</i>), Narrow-leaved ironbark (<i>E. crebra</i>) (T), Queensland blue gum (<i>E. tereticornis</i>) (T) in association with Pink bloodwood (<i>Corymbia intermedia</i>), Moreton Bay ash (<i>C. tessellaris</i>), Broad-leaved apple (<i>Angophora subvelutina</i>), Kurrajong (<i>Brachychiton populneus</i>). (T) = Suitable timber species – note conservation features over page
Regional ecosystems	Main: 12.12.7, 12.12.8, 12.12.12; Others: 12.9-10.7, 12.9-10.8.
Pasture composition	
Desirable pasture species	Queensland bluegrass, Forest bluegrass, Kangaroo grass, Black speargrass, Scented top, native legumes, Rhodes grass, Creeping blue grass.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Couch grass, Native panic.
Undesirable pasture species	Wire grasses, Blady grass, Slender chloris, Native rat's tail grass, Native lovegrass.
Suitable sown pastures	Rhodes grass (Callide), Creeping bluegrass, Pangola grass, Siratro, Leucaena, Caatinga stylo, Clover, Medics.

Introduced weeds	Lantana, Creeping lantana, African boxthorn.
Soil	Mostly Prairie soils (Shallow clays and clay loams) and some Shallow hillside soils.
Description	Mostly shallow, dark, friable clay loams and clays over weathered rock (Prairie soils). Also Shallow soils with loamy surfaces over red-brown well structured clays (Shallow hillside soils also known as Non-calcic brown soils). Surfaces can be loose to self-mulching, occasionally hard setting.
Key properties	Plant available water capacity: Low (Shallow hillside soils) to medium (Prairie soils). Fertility: Shallow hillside soils (low to medium) and Prairie soils (medium to high). pH: Surface – Shallow hillside soils (6.0 to 7.0), Prairie soils (6.5 to 7.5); Subsoil – Shallow hillside soils (6.7 to 7.2), Prairie soils (7.5 to 8.5). Salinity: Very low in surface and subsoils except moderate values in Prairie subsoils. Sodicity: All non-sodic. Effective rooting depth: <0.6 m (Shallow hillside soils) and <0.8 m (Prairie soils).
Stocking rates	Cleared native pastures: 1 AE / 4 ha. Improved pastures: 1 AE / 3 ha.
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Cattle breeding and fattening; Managed native forest.
Land use and management recommendations	Suitable for grazing of non-irrigated improved pastures. Grain, fodder and small crops may be grown on areas with suitable depth soils (>0.5 m) and low slopes (<10%). If suitable for cropping, soil conservation measures including contour banks and waterways should be implemented with surface cover maximised through stubble retention and minimum tillage to maintain soil structure and reduce erosion. Very shallow soils or stony soils are not suited for development and should be left as undisturbed as possible with maximum surface cover (>90%) maintained at all times to minimise erosion risk. Timber and other woody vegetation should be retained on ridges and steep slopes. Planned burns every 3–6 years from spring to late autumn with a low intensity fire. Burn with sufficient soil moisture and aim to burn 40–60% burn using spot ignition strategy to encourage mosaics so that a patchwork of burnt/unburnt is achieved.
Land use limitations	Effective rooting depth limited by depth to bedrock. Low plant available water capacity due to shallow soil depths. Hard setting with large amounts of gravel and stone (lithosols). Highly erodible on steep slopes with poorly structured soils.
Conservation features	These woodlands provide important wildlife habitat. Mature stands with numerous tree hollows are home to a variety of reptiles, birds and arboreal mammals including possums, koalas and gliders. The rough fissured bark of the ironbarks is ideal habitat for skinks and geckoes. The grassy understorey provides habitat for ground fauna such as bettongs, bandicoots, marsupial mice, reptiles, birds and invertebrates and is an important food source for large macropods like whip-tailed wallabies and eastern grey kangaroos. While less steep areas have been cleared or thinned for grazing, relatively intact areas occur. With appropriate fire and grazing management, these woodlands provide significant habitat and linkages to other vegetation in the landscape. Upland areas near Somerset Dam, Deer Reserve NP and Brisbane Ranges are important in a bio-geographic sense with many species limited to these areas.

Ironbark woodlands on duplexes and loams



Land Resource Area	Marburg forest (7a), Northern mixed volcanics (3c), Metamorphic hills (4).
Landform	Lower slopes, hills and rises associated with coarse sediments of Esk and Bryden Formations, mixed volcanics of Neara volcanics and Cressbrook Creek and metamorphics of Maronghi Creek and Fernvale-Neranleigh Beds.
Occurrence	Widespread across upper Brisbane Valley from Mt Stanley south to Toogoolawah, Cressbrook Creek and Crossdale and Bryden districts.
Broad vegetation description	Dry eucalypt woodlands to open woodlands, mostly on shallow soils in hilly terrain. Most extensive on sandstone and weathered rocks
Native trees and shrubs	Predominantly Narrow-leaved ironbark (<i>Eucalyptus crebra</i>)(T), Silver-leaved ironbark (<i>E.melanophloia</i>), Forest red gum (<i>E.tereticornis</i>)(T), with Moreton Bay ash (<i>Corymbia tessellaris</i>), Pink bloodwood (<i>C.intermedia</i>)(T), Grey ironbark (<i>E.siderophloia</i>)(T), Broad-leaved apple (<i>Angophora subvelutina</i>), Smooth-barked apple (<i>A.leiocarpa</i>), Kurrajong (<i>Brachychiton populneus</i>), wattles (<i>Acacia</i> spp.).
Regional ecosystems	Main: 12.9-10.7, 12.9-10.8, 12.11.8, 12.11.14 Others: 12.5.2, 12.9-10.19, 12.11.7, 12.11.22, 12.12.7, 12.12.8, 12.12.12, 12.12.25
Pasture composition	
Desirable pasture species	Forest bluegrass, Kangaroo grass, Black speargrass, Scented top, Queensland bluegrass, Rhodes grass, Creeping bluegrass, native legumes.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Couch grass, Native panic.
Undesirable pasture species	Wire grasses, Blady grass, Slender chloris, Native rat's tail grass, Native lovegrass.

Suitable sown pastures

Rhodes grass, creeping bluegrass, Wynn cassia, shrubby stylo, fine stem stylo.

Introduced weeds	African lovegrass, lantana, creeping lantana, giant rat's tail grass (esp. Wivenhoe Pocket).
Soil	
Description	Texture contrast soils including Shallow hillside soils (Non-calcic brown soils), Red and Yellow Podzolics, Loamy and Sandy Solodics, Soloths and Lithosols.
Key properties	<p>Plant available water capacity: Very low (Soloths, Lithosols, Solodics) to low (Hillside soils) and low-medium (Podzolics).</p> <p>Fertility: Can vary (Solodics, Podzolics) but generally low fertility, especially N and P levels.</p> <p>pH: Surface – mostly medium acid to neutral (5.5 to 7.0), Soloths are strongly acid; Subsoil – neutral Shallow hillside soils (6.0 to 7.0), alkaline to strongly alkaline Solodics (8.0 to 9.0), medium to slightly acid Podzolics (5.0 to 6.0) and strongly acid to medium acid Soloths (4.5 to 6.0).</p> <p>Salinity: Low to very low at surface; high subsoil salinity levels in Solodics, Soloths.</p> <p>Sodicity: Non-sodic surface and subsoils, except Solodics and Soloths which are have sodic surface soils and are strongly sodic at depth.</p> <p>Effective rooting depth: <0.3 m (Lithosols), <0.4 m (Solodics, Soloths) and 0.6 m (Shallow hillside soils) to <1.5 m (Podzolics).</p>
Stocking rates	Native pastures: Uncleared 1 AE / 8 ha; Cleared 1 AE / 5-6 ha. Sown dryland: 1 AE / 4-5 ha.
Utilisation	Conservative pasture utilisation: 25% by weight.
Enterprise	Cattle breeding and growing.
Land use and management recommendations	<p>Suitable for grazing of native and occasionally improved pasture; managed native forests. Maintain maximum surface cover (>90%) at all times of the year. Oversewing of legumes should be done with minimal soil disturbance (eg strip cultivation, bandseeding, broadcasting, dispersal by livestock).</p> <p>Maintain timber cover, especially on steeper slopes and ridges to limit hillslope erosion.</p> <p>Burn in summer to winter with a low to moderate intensity fire at varying intervals of 3–6 years for grassy woodlands and 4–25 year intervals for shrubby woodlands. Aim for a 40–60% mosaic burn. Burn with sufficient soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt is achieved.</p>
Land use limitations	<p>Plant growth limited by tough clay subsoil and hard setting surfaces.</p> <p>Rooting depth limited by hard, and saline or acid, subsoils.</p> <p>Hard clay subsoils impede drainage and are prone to waterlogging in wet periods. Dispersible subsoils in Solodics, Soloths.</p> <p>Very susceptible to sheet, tunnel and gully erosion.</p> <p>Generally very low nutrient status, particularly nitrogen and phosphorus.</p>
Conservation features	<p>These woodlands cover a large proportion of the Brisbane Valley and provide important wildlife habitat for a wide range of fauna. The grassy understorey provides habitat for ground fauna such as small marsupials including bettongs, bandicoots, marsupial mice, reptiles, birds and invertebrates and is an important food source for large macropods like whip-tailed wallabies and eastern grey kangaroos. The rough fissured bark of ironbark trees provides habitat for insects, skinks and geckos.</p> <p>Retention of mature stands is necessary as only long lived trees form hollows which are home to various reptiles, birds and arboreal mammals including possums, koalas and gliders.</p> <p>Mosaic burning for regeneration and retention of microhabitats is critical for maintaining species richness. Selective overgrazing in the burnt areas needs to be managed.</p> <p>Conservation management should aim to retain existing remnant patches and encourage connectivity with other native vegetation in the landscape.</p>

Spotted gum and Ironbark forest on duplexes and loams



Land Resource Area	Mainly Helidon forest (7b); also lower part of Northern mixed volcanics (3c) and Metamorphic Hills (5).
Landform	Undulating to steep hills overlying coarse sediments of Helidon Sandstone, metamorphosed sediments of Fernvale-Neranleigh beds and mixed volcanics of Neara Volcanics.
Occurrence	Slopes and foothills of Deongwar, Redbank and Kipper Creek districts, and hilly forest country south of Esk. Also occur on eastern side of Wivenhoe in Crossdale, Bryden, Dundas, Kipper districts.
Broad vegetation description	Dry Spotted gum tall woodlands to open forest, mostly on shallow soils in hilly terrain. Most extensive on sandstone and weathered rocks.
Native trees and shrubs	Predominantly Spotted gum (<i>Corymbia citriodora</i> ssp. <i>variegata</i>)(T) and Narrow-leaved ironbark (<i>Eucalyptus crebra</i>)(T) with Grey ironbark (<i>E.siderophloia</i>)(T), Moreton Bay ash (<i>Corymbia tessellaris</i>), Bloodwoods (<i>C.intermedia</i> , <i>C.trachyphloia</i>)(T), Broad-leaved ironbark (<i>E.fibrosa</i> ssp. <i>fibrosa</i>), Broad-leaved spotted gum (<i>C.henryi</i>), Forest red gum (<i>E.tereticornis</i>)(T), Brush Box (<i>Lophostemon confertus</i>), Swamp box (<i>L. suaveolens</i>), Rusty gum (<i>Angophora leiocarpa</i>), Smudgee (<i>A.woodsiana</i>), Broad-leaved white mahogany (<i>E.carnea</i>), Gum-topped box (<i>E.moluccana</i>)(T), Black sheoak (<i>Allocasuarina littoralis</i>), Forest sheoak (<i>A.torulosa</i>), wattles (<i>Acacia</i> spp.), Red ash (<i>Alphitonia excelsa</i>), Grasstrees (<i>Xanthorrhoea</i> spp.). (T) = Suitable timber species
Regional ecosystems	Main: 12.9-10.2, 12.9-10.5, 12.11.5, 12.11.6 Others: 12.12.5, 12.9-10.12
Pasture composition	

Desirable pasture species	Forest bluegrass, Kangaroo grass, Black speargrass, Scented top, Rhodes grass, Creeping bluegrass, native legumes.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Couch, Native panic.
Undesirable pasture species	Wiregrasses, blady grass, slender chloris, native rat's tail, native lovegrass.
Suitable sown pastures	Rhodes grass, Creeping bluegrass, Wynn cassia, Shrubby stylo, Fine stem stylo.
Introduced weeds	Lantana, Creeping lantana, Giant rat's tail grass, African lovegrass.
Soil	Red earths, Red and Yellow Podzolics, Lithosols, Solodics, Yellow earths.
Description	Mostly red loamy soils (Red earths) and texture contrast soils of brown sandy loams overlaying red, brown or yellow well structured clays (Podzolics). Some areas of shallow soils overlying weathered rock (Lithosols) and sandy and loamy surface soils over hard, alkaline clay subsoils (Solodics). Sandy or loamy, loose to hard setting surface soil.
Key properties	Plant available water capacity: Very low (Lithosols, Solodics); low (Red and Yellow earths); low to medium (Podzolics). Fertility: Variable, but generally low, especially N and P. pH: Surface – Strongly acid (5.2) to slightly acid (6.5) in Podzolics, Earths Solodics; Subsoil – Mostly acid (5.0 to 6.5) in Podzolics, Earths with moderately to strongly alkaline (8.0 to 9.0) in Solodics. Salinity: Low (Red earths, Red Podzolics, Lithosols) with medium to high levels in lower subsoils of Solodics. Sodicity: Mostly non-sodic (Red and Yellow earths, Podzolics, Lithosols) except Solodics which have sodic to strongly sodic subsoils. Effective rooting depth: >1 m (Red and Yellow earths), <1.5 m (Podzolics), Solodics and Lithosols <0.4 m.
Stocking rates	Uncleared native pastures: 1 AE/8 ha; Cleared native pastures: 1 AE/5–6 ha Sown dryland: 1 AE/4-5 ha.
Utilisation	Conservative pasture utilisation: 25% by weight.
Enterprise	Cattle breeding.
Land use and management recommendations	Suitable for grazing of native and occasionally improved pastures; managed native forest. Maintain maximum surface cover (>90%) at all times. Oversowing of legumes should be done with minimal soil disturbance (eg. strip cultivation, bandseeding or broadcast). Maintain as much timber cover as possible, especially on steeper slopes and ridges. Burn every 4 to 25 years in spring to winter with a low to moderate fire with variability in interval, season and intensity critical to maintaining a mosaic of grassy and shrubby understoreys. More frequent fires will maintain grassy woodlands and forests. Aim for a 40% to 60% mosaic burn. Variability in season and intensity is important. Burn with sufficient soil moisture and with spot ignition strategy so that a patchwork of burnt/unburnt is achieved.

<p>Land use limitations</p>	<p>Plant growth limited by soil depth, tough clay subsoil and hard setting surfaces. Rooting depth limited by hard 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.</p>
<p>Conservation features</p>	<p>These woodlands and open forests provide important wildlife habitat for a wide range of fauna including invertebrates, insects, reptiles, birds and mammals. The grassy understorey is home to a variety of marsupials such as bandicoots, bettongs, wallabies and kangaroos. Mosaic burning for regeneration and retention of microhabitats is critical for maintaining species richness. Selective overgrazing in the burnt areas needs to be managed. Retention of mature trees is necessary as only long-lived trees form hollows which provide homes for reptiles, birds and arboreal mammals such as koalas, possums, and gliders. Conservation management should aim to retain existing remnant patches and encourage connectivity with other native vegetation in the landscape.</p>

Ironbark woodland/forest on granite



Land Resource Area	Granite hills (5).
Landform	Rolling hills and mountains of coarse-grained igneous rocks (granite, granodiorite) – mostly associated with Eskdale granodiorite and Kimbala granodiorite.
Occurrence	Hills and ranges in Eskdale, Anduramba districts west of Toogoolawah and granite outcrops in Biarra and Jimna Ranges and Mt Boorran.
Broad vegetation description	Dry grassy ironbark woodlands and open forest on granite country.
Native trees and shrubs	Silver-leaved ironbark (<i>Eucalyptus melanophloia</i>), Narrow-leaved ironbark (<i>E. crebra</i>)(T), Grey ironbark (<i>E. siderophloia</i>)(T), Pink Bloodwoods (<i>Corymbia intermedia</i>), Forest red gum (<i>E. tereticornis</i>)(T), Moreton Bay ash (<i>C. tessellaris</i>), Broad-leaved apple (<i>Angophora subvelutina</i>), Grey box (<i>E. moluccana</i>), Stringybark (<i>E. acmenoides</i>), Kurrajong (<i>Brachychiton populneus</i>), Wattles (<i>Acacia</i> spp.), Red ash (<i>Alphitonia excelsa</i>), Forest sheoak (<i>Allocasuarina torulosa</i>). (T) = Suitable timber species – note conservation features over page.
Regional ecosystems	Main: 12.12.8, 12.12.12 Others: 12.12.7, 12.12.23
Pasture composition	
Desirable pasture species	Black speargrass, Kangaroo grass, Forest bluegrass, Scented top, Rhodes grass, Creeping bluegrass, native legumes.

Intermediate pasture species	Pitted bluegrass, Red Natal, Barbwire grass, Tambookie grass, Native panic, Couch.
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 (Earthy sands); or sandy loams overlying red or yellow strongly structured clays (Podzolics). Some areas of shallow soils overlying bedrock (Lithosols). Hard setting surface on earthy sands that still have usually high permeability.
Key properties	Plant available water capacity: Low in all soils. Fertility: Generally low nutrient status, especially N and P. pH: Surface – acid to neutral (6.0 to 7.0); Subsoil – neutral (7.0) in Earthy sands and Lithosols, mostly acid to strongly acid (5.2 to 6.5) in Red and Yellow Podzolics. Salinity: Very low salinity levels in all soils. Sodicity: Non-sodic for all soils. Effective rooting depth: >1 m (Earthy Sands), <1.5 m (Podzolics), <0.3 m (Lithosols).
Stocking rates	Native pastures: Uncleared 1 AE / 8-9 ha; Cleared 1 AE / 5-6 ha; Improved 1 AE / 4-5 ha.
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Cattle breeding and stores; managed native forest.
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 (>90%) at all times to reduce erosion. Spell pastures when flowering and seeding. Do not cultivate on slopes >8%. Burn every 3–6 years in summer to late autumn with a low intensity fire to maintain diverse grassy understorey and help control weeds. Aim to burn 40–60% of any given area. Burn with sufficient soil moisture and with a spot ignition strategy to encourage mosaics so that a patchwork of burnt/unburnt is achieved.
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.
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.

Ironbarks and spotted gum ridges



Land Resource Area	Mostly Volcanic peaks (3a), Metamorphic hills (4), Marburg forest (7a) with some on Northern mixed volcanics (3c).
Landform	Steep hills and mountains associated with trachyte and rhyolite peaks, metamorphosed sediments of Maronghi Creek Beds and Neranleigh-Fernvale Beds, coarse sediments of Esk and Bryden Formations, and mixed volcanics and sediments of Neara Volcanics.
Occurrence	Isolated peaks - Mt Esk, Glen Rock, McKeys Hill and parts of the Biarra and Blackbutt Ranges in the west, Brisbane and Jimna Ranges in the north and D'Aguilar Range.
Broad vegetation description	Dry woodlands to open forests on steep hills and mountains dominated by Ironbark and/or Spotted gum.
Native trees and shrubs	Spotted gum (<i>Corymbia citriodora</i> subsp. <i>variegata</i>)(T), Narrow-leaved ironbark (<i>Eucalyptus crebra</i>)(T), Grey ironbark (<i>E. siderophloia</i>)(T), Forest red gum (<i>E. tereticornis</i>)(T), White mahogany (<i>E. acmenoides</i>)(T), Broad-leaved ironbark (<i>E. fibrosa</i> spp. <i>fibrosa</i>)(T), Bloodwoods (<i>C. intermedia</i> , <i>C. trachyphloia</i>)(T), Grey gums (<i>E. major</i> , <i>E. longirostrata</i>)(T), Moreton Bay ash (<i>C. tessellaris</i>), Smooth-barked apple (<i>Angophora leiocarpa</i>), Grey box (<i>E. moluccana</i>), Silver-leaved ironbark (<i>E. melanophloia</i>), Black wattle (<i>Acacia leocalyx</i>), Brisbane wattle (<i>A. fimbriata</i>), Black sheoak (<i>Allocasuarina littoralis</i>), Red ash (<i>Alphitonia excelsa</i>), Grasstrees (<i>Xanthorrhoea</i> spp.), Hopbush (<i>Dodonea viscosa</i>). Some communities possess a shrubby understorey. (T) = Suitable timber species – note conservation features over page.
Regional ecosystems	Main: 12.9-10.2, 12.9-10.5, 12.9-10.7, 12.9-10.8, 12.11.5, 12.11.8, 12.11.14 Others: 12.11.22, 12.12.5, 12.12.7, 12.12.8, 12.12.9, 12.12.24

Pasture composition	
Desirable pasture species	Kangaroo grass, Forest bluegrass, Black speargrass, Scented top, native legumes.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Native panic, Couch.
Undesirable pasture species	Wiregrasses, Blady grass, Slender chloris, Native rat's tail grass, Native lovegrass.
Suitable sown pastures	Sowing of pastures not recommended because of erosion risk and fertility status. Legumes for dispersal: Siratro, wynn cassia, shrubby stylo, fine stem stylo.
Introduced weeds	Creeping lantana, lantana.
Soil	Mostly Lithosols and Shallow hillside soils; some Solodics.
Description	Shallow soils overlying rock, often rocky and gravelly (Lithosols) and shallow texture contrast soils of loams or loamy sands over red, brown or yellow clay subsoils (Shallow hillside soils and solodics). Solodics often with a prominent bleached zone above hard clay subsoil.
Key properties	Plant available water capacity: Low (Hillside soils) to very low (Lithosols, Solodics). Fertility: Generally low to very low (Lithosols, Hillside soils); can vary in some Solodics. pH: Lithosols and Hillside soils have medium acid to neutral (6.0 to 7.0); Solodics have acid to neutral surface (5.5 to 6.6) over generally moderately alkaline subsoil (8.0 to 9.0). Salinity: Generally very low but subsoil salinity can be high in Solodics. Sodicity: Non-sodic (Lithosols, Hillside soils); Solodics are sodic to strongly sodic at depth. Effective rooting depth: <30 cm.
Stocking rates	Native pastures: Uncleared 1 AE / 8 ha; Cleared 1 AE / 6-7 ha.
Utilisation	Conservative pasture utilisation: 25% by weight.
Enterprise	Beef breeding and growing stores; managed native forest.
Land use and management recommendations	Suitable for grazing of native pastures and managed native forest. Not suitable for sown pastures due to erosion risks and fertility status. Low key legume establishment (broadcast, dispersal via livestock) only. Maintain maximum surface cover (>90%) at all times of the year. Maintain timber cover, especially on steeper slopes and ridges to limit hillslope erosion. For most REs, burn every 4 to 25 years in summer to winter with a low to moderate fire to control thick regrowth if restricting grass cover. Grassy woodlands will require shorter intervals of 3–6 years. Variability in season and intensity is important. Burn with sufficient soil moisture and with spot ignition strategy so that a patchwork of burnt/unburnt country is achieved. Aim for a 40–60% mosaic burn.
Land use limitations	Plant growth limited by tough clay subsoil and hard setting surfaces. Rooting depth limited by depth to bedrock and hard sodic clay subsoils in Solodics. Very susceptible to sheet, tunnel and gully erosion. Generally very low nutrient status, particularly nitrogen and phosphorus.

<p>Conservation features</p>	<p>These dry eucalypt woodlands and forests provide habitat for a variety of arthropods, reptiles, birds and mammals.</p> <p>Some regional ecosystems like 12.12.9 (Queensland peppermint and Brown bloodwood shrubby woodland on volcanic rhyolite hills near Esk) have regional biodiversity significance and contain a number of rare and threatened species.</p> <p>Because of their location on hills and mountains these communities are often relatively intact and as well as habitat values, also provide significant landscape values through altitudinal and biogeographic corridor linkages for faunal and floral movement and genetic transfer.</p> <p>Retaining adequate numbers of habitat trees is important for forest health and biodiversity.</p> <p>The careful use of fire (especially following disturbance such as thinning or harvesting) allows forest regeneration and can be used proactively to promote biodiversity values within the land type and across the landscape.</p>
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Gum-topped box open forest



<p>Land Resource Area</p>	<p>Marburg forest (7a), Metamorphic hills (4), Northern mixed volcanics (3c), Granite hills (5).</p>
<p>Landform</p>	<p>Undulating rises, colluvium, hillslopes, crests and ridges associated with coarse sediments of Esk and Bryden Formations, metasediments of Maronghi Creek and metamorphics of Fernvale-Neranleigh Beds and occasionally mixed volcanics of Neara Volcanics and Cressbrook Creek Group.</p>
<p>Occurrence</p>	<p>Occurs in small patches on texture contrast soils across the Brisbane Valley.</p>
<p>Broad vegetation description</p>	<p>Gum topped box open forest or woodland.</p>
<p>Native trees and shrubs</p>	<p>Predominantly Gum-topped box (<i>Eucalyptus moluccana</i>) sometimes with Narrow-leaved ironbark (<i>E.crebra</i>) (T), Spotted gum (<i>Corymbia citriodora</i>) (T), Forest red gum (<i>E.tereticornis</i>) (T), Broad-leaved ironbark (<i>E.fibrosa</i>), Grey gum (<i>E.longirostrata</i>) (T), Yellow stringybark (<i>E.acmenoides</i>) (T), Brush box (<i>Lophostemon confertus</i>), Black sheoak (<i>Allocasuarina littoralis</i>), Forest sheoak (<i>A.torulosa</i>), Red ash (<i>Alphitonia excelsa</i>), Maiden's wattle (<i>Acacia maidenii</i>). (T) = Suitable timber species – note conservation features over page.</p>
<p>Regional ecosystems</p>	<p>Main: 12.9-10.3, 12.11.18 Others: 12.12. 28</p>

Pasture composition	
Desirable pasture species	Forest bluegrass, Kangaroo grass, Black speargrass, Scented top, native legumes..
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Couch grass, Native panic
Undesirable pasture species	Wiregrasses, Blady grass, Slender chloris, Native rat's tail grass.
Suitable sown pastures	Not suitable for sown pastures due to erosion risk with soil disturbance. Legumes such as Wynn cassia, Shrubby stylo may be broadcast or dispersed via animals at some sites.
Introduced weeds	Lantana, Creeping lantana, African lovegrass
Soil	Texture contrast soils mainly Soloths and Solodics, sometimes Lithosols.
Description	Texture contrast soils of brown to dark grey loamy sands overlaying hard red, brown or yellow clay subsoils. Sandy or loamy, loose to hard setting surface soil.
Key properties	Plant available water capacity: Very low (all). Fertility: Generally very low especially N & P levels. pH: Surface – strongly acid 5.4 (Soloths, Solodics) to neutral 6.6 (Lithosols); Subsoil - strongly acid to medium acid 4.5–6.0 (Soloths), medium acid to neutral 6.0–6.6 (Lithosols), to alkaline 8.0–9.0 (Solodics). Salinity: Very low at surface (all); high salinity at depth (Soloths, Solodics). Sodicity: Non-sodic at surface (all); strongly sodic at depth (Soloths, Solodics). Effective rooting depth: <0.4 m (Soloths, Solodics, Lithosols).
Stocking rates	Uncleared native pastures: 1 AE/8 ha; Cleared native pastures: 1 AE/5–6 ha.
Utilisation	Conservative pasture utilisation: 25% by weight.
Enterprise	Cattle breeding.
Land use and management recommendations	Suitable for grazing of native pastures and managed native forest. Very susceptible to erosion. Maintain maximum surface cover (>90%) at all times. Not suitable for pasture development. Retain timber cover, especially on steeper slopes and ridges to limit hillslope erosion. Avoid earthworks. If earthworks are essential, topsoil should be conserved and ensure subsoil is not exposed. Do not construct drains. Dam banks need to be compacted during construction, grassed and protected to prevent tunnelling and failure. Planned burns from spring to late autumn of varying intervals from 4 to 6 years for grassy woodlands and 4–25 years for shrubby open forest communities. Aim for low to moderate intensity fire over 40–60% of area using spot ignition in cooler periods and with sufficient soil moisture to ensure a mosaic of burnt/unburnt country 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

<p>Conservation features</p>	<p>These woodland and forest remnants are habitat for a variety of mammals, birds, reptiles and invertebrates. In conjunction with surrounding vegetation communities these woodlands provide important corridors through the landscape for both resident and dispersing fauna.</p> <p>Frequent fires reduce the shrubby understorey, but variable fire regimes encourage mosaics. Mosaic burning for regeneration and retention of microhabitats is critical for maintaining species richness. Selective overgrazing in the burnt areas needs to be managed to allow pastures to recover and maintain groundcover to prevent erosion.</p> <p>Retention of mature trees is necessary, as only long-lived trees will form hollows for a variety of birds, reptiles and arboreal mammals including koalas, gliders, and possums.</p> <p>Conservation management should aim to retain remnant patches especially where these offer connectivity values.</p>
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Tall open forests on steep hills and mountains



<p>Land Resource Area</p>	<p>Mainly Metamorphic hills (4), Marburg forest (7a), isolated patches on Granite hills (5).</p>
<p>Landform</p>	<p>Steep hills and mountains associated with metamorphosed sediments of Maronghi Creek Beds and Neranleigh-Fernvale Beds and the coarse sediments of Esk and Bryden Formations with some patches on Eskdale and Kimbala granodiorite.</p>
<p>Occurrence</p>	<p>Along the Biarra and Blackbutt Ranges in the west, Brisbane and Jimna Range to the north and the D'Aguiar Range to the east.</p>
<p>Broad vegetation description</p>	<p>Tall dry eucalypt forests on the slopes and ridges of steep hills and mountain ranges.</p>

Native trees and shrubs	Grey gums (<i>Eucalyptus propinqua</i> , <i>E. major</i>)(T), White mahogany (<i>E. acmenoides</i>)(T), Blackbutt (<i>E. pilularis</i>)(T), Tallowwood (<i>E. microcorys</i>)(T), Spotted gum (<i>Corymbia citriodora</i> ssp. <i>variegata</i>)(T), Narrow-leaved ironbark (<i>Eucalyptus crebra</i>)(T), Forest red gum (<i>E.tereticornis</i>)(T), Pink bloodwood (<i>Corymbia intermedia</i>)(T), Grey ironbark (<i>E.siderophloia</i>)(T), Brush box (<i>Lophostemon confertus</i>) (T), Tindale's stringybark (<i>E.tindaliae</i>), Brown bloodwood (<i>C.trachyphloia</i>)(T), Grey box (<i>E.moluccana</i>)(T), Broad-leaved ironbark (<i>E.fibrosa</i>), Smooth-barked apple (<i>Angophora leiocarpa</i>), Sydney Blue gum (<i>E.saligna</i>)(T), Turpentine (<i>Syncarpia verecunda</i>), Forest sheoak (<i>Allocasuarina torulosa</i>), Blackwood (<i>Acacia melanoxylon</i>) and understorey of rainforest species at some locations. (T) = Suitable timber species – note conservation features over page.
Regional ecosystems	Main: 12.9-10.17, 12.11.3, 12.11.5, 12.12.12, 12.12.15 Others: 12.9-10.14, 12.11.2, 12.12.23, 12.12.28
Pasture composition	
Desirable pasture species	Kangaroo grass, Forest bluegrass, Black speargrass, Scented top, Rhodes grass, native legumes.
Intermediate pasture species	Tambookie grass, Pitted bluegrass, Barbwire grass, Couch, Native panic, Native sorghum.
Undesirable pasture species	Wiregrasses, Reedgrasses, Blady grass, Slender chloris, Native rat's tail grass, Native lovegrass.
Suitable sown pastures	Not recommended in some situations due to potential for erosion. Suitable on deep soils, low slopes: Rhodes grass, Creeping bluegrass, Shrubby and Fine stem stylo, Wynn cassia.
Introduced weeds	Lantana, creeping lantana, Braken fern.
Soil	Lithosols, Red and Yellow Podzolics, Shallow hillside soils, Solodics.
Description	Texture contrast soils of loamy sands (loose to hard setting, sometimes gravelly or very shallow) overlaying red,yellow or brown well structured clays (Podzolics and Hillside soils); or very shallow soil overlying weathering rock (Lithosols).
Key properties	Plant available water capacity: Very low (Lithosols, Solodics) to low (Podzolics). Fertility: Generally very low (Lithosols) to low (Podzolics, Hillside, Solodics). pH: Medium acid to neutral (Lithosols, Hillside soils); Strongly to slightly acid (Podzolics); Moderately acid to neutral surface soils over alkaline subsoils (Solodics). Salinity: Very low to low. Sodicity: Non-sodic (Lithosols, Podzolics and Hillside soils); Solodics are highly sodic. Effective rooting depth: <0.3 m (Lithosols, Hillside soils, Solodics) to 1 m (Podzolics).
Stocking rates	Native: Uncleared: 1 AE /8-10 ha. Cleared: 1 AE / 5-6 ha. Sown pastures (limited situations): 1 AE / 4 ha
Utilisation	Conservative pasture utilisation: 25% by weight.
Enterprise	Cattle breeding and growing; Managed native forests and hardwood plantations.

<p>Land use and management recommendations</p>	<p>Most suited to grazing of native pastures and native forest management. Sown pastures generally only suited to gentle slopes with deeper soils. 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 4–8 year intervals, with an occasional high intensity fire for grassy systems, with longer intervals 8–20 years for those with shrubby or vine forest understorey. 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 either open understorey of predominantly non-rainforest species or rainforest dominated understorey). Aim for mosaic burn of 40–60% over burn area using spot ignition in cooler or moister periods. This is more difficult to achieve when higher intensity, longer interval fires are required.</p>
<p>Land use limitations</p>	<p>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. Soils may become hard setting reducing infiltration and increasing runoff. Surface stone can also be a problem. Red podzolics and Hillside soils generally well drained. Yellow Podzolics and Solodics are often poorly drained resulting in waterlogging after heavy rain.</p>
<p>Conservation features</p>	<p>These tall dry eucalypt forests provide habitat for a variety of arthropods, reptiles, birds and mammals, including a number of rare and threatened species. Because of their position on steep hills and mountains, these communities are often relatively intact and as well as habitat values, provide significant landscape values through altitudinal and biogeographic corridor linkages for faunal and floral movement and genetic transfer. They have been important sources of timber in the past and are well represented in protected areas including Benarkin, Squirrel Creek, Diaper and Jimna Forest Reserves and D'Aguilar National Park. Retaining adequate numbers of hollows and habitat trees is important in maintaining habitat for a range of arboreal mammals, birds and reptiles</p>

Tall open forests on basalt and mixed volcanics



Land Resource Area	Red volcanics (2a) and Northern mixed volcanics (3c).
Landform	Undulating plateaus, rises and ranges of weathered Tertiary basalt and mixed volcanics (mainly andesite).
Broad vegetation description	Moist to dry open forests to woodlands mainly on basalt areas and mixed volcanics.
Native trees and shrubs	Dry tall forests - Grey ironbark (<i>Eucalyptus siderophloia</i>)(T), Grey gums (<i>E.biturbinata</i> , <i>E.propinqua</i> , <i>E.major</i> , <i>E.longirostrata</i>)(T), White mahogany (<i>E.acmenoides</i>)(T), Bloodwood (<i>Corymbia intermedia</i>)(T), possibly Tallowwood (<i>E.microcorys</i>)(T), Blackbutt (<i>E.pilularis</i>)(T), Brush box (<i>Lophostemon confertus</i>)(T), Forest sheoak (<i>Allocasuarina torulosa</i>), Blackwood (<i>Acacia melanoxylon</i>). Moist tall forests – Grey ironbark, Grey gums, Tallowwood, Blackbutt, White mahogany, Brush box and Sydney blue gum (<i>E.saligna</i>)(T), Rose gum (<i>E.grandis</i>)(T). Given they are often found adjacent to areas of rainforest these tall forests sometimes have an understorey of scrub species. (T) = Suitable timber species – note conservation features over page.
Regional ecosystems	Main: 12.5.6, 12.12.2, 12.12.15
Pasture composition	
Desirable pasture species	Queensland blue, forest blue, kangaroo, black spear, Rhodes, scented top, kikuyu, paspalum, green panic.
Intermediate pasture species	Pitted bluegrass, Barbwire grass, Native panic, Couch, Native sorghum, Tussock grass.
Undesirable pasture species	Wiregrasses, Blady grass, Slender chloris, Native rat's tail grass.
Suitable sown pastures	Rhodes, kikuyu, paspalum, green panic, creeping bluegrass. White clover, glycine, siratro.
Introduced weeds	Lantana, wild tobacco tree, blady grass, privet, Braken fern.
Soil	Mainly Krasnozems, Shallow clays and Clay loams. Some Brown clays.
Description	Krasnozems - Deep, (often > 5m) red, strongly structured clays that are friable and highly permeable. Also shallow, dark friable clay loams and clays over parent rock.
Key properties	Plant available water capacity: High (Krasnozems and Brown Clays); moderate to low for Clay loams and clays depending on soil depth. Fertility: Medium to high. pH: Acid to strongly acid soils (Krasnozems pH 5–6.5); slightly acid to neutral surface over alkaline subsoils (Clay loams and Clays). Salinity: Low to very low. Sodicity: Non-sodic. Effective rooting depth: >1.5 m (Krasnozems); <1 m for Clay loams and clays.
Stocking rates	Cleared native pastures: 1 AE / 3 ha; Improved pastures (dryland): 1 AE / 2 ha.
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Cattle growing and fattening; managed native forest and hardwood plantations.

<p>Land use and management recommendations</p>	<p>Suitable for grazing of native and improved pastures, with some pockets on plateaus and gentle upland rises suitable for dryland and irrigated cropping. Maintain maximum surface cover to maintain soil structure and reduce erosion. Avoid traffic and cultivation when wet to reduce soil compaction. Use crop rotations, legumes and ley pasture to improve soil structure and enhance long-term soil stability and soil organic matter.</p> <p>Regular additions of fertiliser are required to maintain productivity. Use soil tests to monitor nutrient levels and lime requirements to manage strongly acid soils. Adopt practices such as minimum tillage and stubble mulching to maintain soil structure and reduce erosion on sloping lands. Do not cultivate on slopes greater than 10%. Soil conservation measures and management strategies aimed at cover are required on sloping land.</p> <p>Burn (summer to winter) with a low to moderate intensity fire at 4–8 year intervals, with an occasional high intensity fire for grassy systems. Longer intervals (7–25 years) for those with shrubby or vine forest understorey. It is essential that wildfires are not the sole source of fire input in this ecosystem. Needs disturbance to maintain RE structure (eucalypt overstorey with open understorey of predominantly non-rainforest species or rainforest dominated understorey). Aim for mosaic burn of 40–60% over burn area using spot ignition in cooler or moister periods.</p>
<p>Land use limitations</p>	<p>Surface structure becomes cloddy and hard setting under cultivation; plough pans may develop.</p> <p>Effective rooting depth limited by very strongly acid subsoils. Fertility is variable and declines rapidly after development.</p> <p>Highly erodible on cultivated slopes >3% (krasnozems). Landslip risk in some areas.</p>
<p>Conservation features</p>	<p>These tall dry and moist forests are associated with higher rainfall on elevated and fertile sites. They have been cleared for agriculture in some areas, resulting in ecosystems like RE 12.5.6 being classified as Endangered in SEQ. They have been important sources of timber in the past and are well represented in protected areas such as Deongwar, Benarkin, Squirrel Creek Forest Reserves and D’Aguilar and Deer Reserve National Parks.</p> <p>These tall forests have significant biodiversity values and form close associations and corridors across the landscape with rainforest and other communities. They have outstanding fauna value, especially for arboreal hollow dependent species. Mainly occur in upland areas which are important in a biogeographic sense with many species limited to these areas. Some tall forests contain significant springs, supporting a diversity of flora and fauna.</p>

Softwood vine scrub



Land Resource Area	Principally Scrub Walloons (6b). Also Volcanic peaks (3a), Northern mixed volcanics (3c), Metamorphic hills (4), Marburg forest (7a).
Landform	Undulating to steep hills overlying Neara Volcanics and coarse sediments of the Esk Formation.
Occurrence	Hilly scrub country around Deer Reserve and Gregors Creek districts, Coal Creek and Mt Beppo districts, and foothills and slopes along D'Aguiar Range (Crossdale, Mt Byron, Dundas districts), Deongwar and Kipper districts, along Blackbutt Range (Googa, Benarkin), Mt Stanley and Head of the River State Forests, Diaper and Squirrel Creek and hills and protected slopes around Linville and Kangaroo Creek.
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. Also includes semi-evergreen vine thickets.
Native trees and shrubs	Hoop pine (<i>Araucaria cunninghamii</i>)(T), Crow's ash (<i>Flindersia australis</i>)(T), Deep yellowwood (<i>Rhodesphaera rhodanthema</i>)(T), Brush whitewood (<i>Atalaya salicifolia</i>), Red cedar (<i>Toona australis</i>)(T), Satinwood (<i>Premna lignum-vitae</i>), Stinging trees (<i>Dendrocnide</i> spp.), Lacebark tree (<i>Brachychiton discolor</i>), Bunya pine (<i>A.bidwilli</i>)(T), Silky oak (<i>Grevillea robusta</i>), Native olive (<i>Olea paniculata</i>), Myrtle ebony (<i>Diospyros geminata</i>), Python tree (<i>Austromyrtus bidwilli</i>), Bitterbark (<i>Alstonia constricta</i>), Figs (<i>Ficus</i> spp.), White tamarind (<i>Ellattostachys xylocarpa</i>), Small-leaved tamarind (<i>Cupaniopsis parvifolia</i>), Booyongs (<i>Argyrodendron</i> spp.). (T) = Suitable timber species.
Regional ecosystems	Main REs: 12.9-10.15, 12.9-10.16, 12.11.11, 12.12.13 Others: 12.8.13, 12.11.10, 12.12.16
Pasture composition	Minimal Grassy understorey in undisturbed scrub remnants.
Desirable pasture species	Queensland blue, forest blue, kangaroo, Rhodes, kikuyu, paspalum, green panic.
Intermediate pasture species	Red Natal, pitted blue, barbed wire, couch grass, native panic, native sorghum.
Undesirable pasture species	Wiregrasses, blady grass, slender chloris, native rat's tail, slender bamboo grass.
Suitable sown pastures	Callide Rhodes, green panic, kikuyu, paspalum, creeping bluegrass. Siratro, glycine, clovers, medics, stylos (shrubby & fine stem), leucaena.

Introduced weeds	African boxthorn, lantana, creeping lantana.
Soil	Mostly Brown and Grey clays and Prairie soils; some Brown earths.
Description	Brown cracking clays with brown, reddish-brown or grey alkaline subsoils (Brown and Grey clays). Shallow dark, clay loams over weathered parent rock (Prairie soils). Friable, well drained loamy soils that are brown, yellowish brown or reddish brown (Brown earths).
Limitations	Bedrock 30 to 80 cm in shallow clays.
Key properties	Plant available water capacity: Low (shallow Prairie soils) to medium-high (Clays). Fertility: Medium to high fertility in all soils; P levels can be low in Brown Clays. pH: 6.5 to 7.6 at surface. Subsoils neutral–slightly alkaline (Prairie soils) to strongly alkaline (7.6 to 9.4) in Brown and Grey clays. Salinity: Low–very low (Prairie soils); medium subsoil values in Brown and Grey clays. Sodicity: Non-sodic (Prairie soils) to sodic subsoils in some Brown and Grey clays. Effective rooting depth: <1 m.
Stocking rates	Cleared native pastures: 1 AE / 3 ha. Improved pastures: 1 AE / 1-2 ha
Utilisation	Conservative pasture utilisation: 30% by weight.
Enterprise	Breeding and fattening; hoop pine and hardwood plantations
Land use and management recommendations	Suitable for grazing of improved pastures and timber plantations. Generally not suitable for agricultural development due to slope and soil limitations, however short-term forage crops may be grown in well drained gently sloping areas with deeper soils. In these isolated cases, soil conservation structures and practices such as minimum tillage, stubble mulching, weed control must be implemented to maintain soil structure and reduce erosion. Maintain adequate surface cover (>90%) at all times of the year. Routinely spell pastures to allow seed set and improve vigour, resilience and dominance of desirable species. 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.
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.
Conservation features	Significant areas of softwood scrub have been cleared for improved pastures and Hoop pine plantations, with many remnants fragmented or isolated. Because of this historic clearing on certain land zones, several vine forest ecosystems are classified as Endangered (RE 12.9- 10.15) or Of-Concern (RE 12.9-10.16 and 12.8.13). These dry rainforest communities are extremely diverse and provide habitat for rare and threatened flora and fauna, including the Black-breasted button quail. Remnants are threatened by weed invasion and hot fires on their margins, with fire intensity increased by the presence of some sown pastures such as Green panic. Natural regeneration should be encouraged to increase extent, improve buffers and develop connectivity with other areas of remnant vegetation.

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)	<p>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.</p> <p>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</p>
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 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)	<p>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.</p> <p>Potential acid sulfate soils:</p> <ul style="list-style-type: none"> • 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 stream 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	<p>A condition of well-structured surface soil, notably of clays, in which the aggregates fall</p> <p>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</p>

which, however, will reform 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 Brisbane Valley

RE Short Description

- 12.3.1 Gallery rainforest (notophyll vine forest) on alluvial plains
- 12.3.2 *Eucalyptus grandis* tall open forest on alluvial plains
- 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.
- 12.3.9 *Eucalyptus nobilis* tall open forest on alluvial plains
- 12.3.11 *Eucalyptus siderophloia*, *E. tereticornis*, *Corymbia intermedia* open forest on alluvial plains near coast
- 12.5.2 *Eucalyptus tereticornis*, *Corymbia intermedia* on remnant Tertiary surfaces, usually near coast. Usually deep red soils
- 12.5.6 *Eucalyptus siderophloia*, *E. propinqua*, *E. microcorys* and/or *E. pilularis* tall open forest on remnant Tertiary surfaces. Usually deep red soils
- 12.5.7 *Corymbia citriodora*, *Eucalyptus portuensis*, *E. fibrosa* subsp. *fibrosa* open forest on remnant Tertiary surfaces. Usually deep red soils
- 12.5.13 Microphyll to notophyll vine forest ± *Araucaria cunninghamii* on remnant Tertiary surfaces
- 12.8.4 Complex notophyll vine forest with *Araucaria* spp. on Cainozoic igneous rocks
- 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
- 12.8.15 *Poa labillardieri* grassland on Cainozoic igneous rocks
- 12.8.16 *Eucalyptus crebra*, *E. tereticornis* woodland on Cainozoic igneous rocks
- 12.8.17 *Eucalyptus crebra*, *E. melanophloia* woodland on Cainozoic igneous rocks
- 12.8.21 Semi-evergreen vine thicket with *Brachychiton rupestris* on Cainozoic igneous rocks.

Southern half of bioregion

- 12.8.23 *Acacia harpophylla* open forest on Cainozoic igneous rocks
- 12.8.24 *Corymbia citriodora* open forest on Cainozoic igneous rocks especially trachyte
- 12.8.26 *Corymbia trachyphloia* and *Eucalyptus major* woodland on 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
- 12.9-10.14 *Eucalyptus pilularis* tall open forest on sedimentary rocks
- 12.9-10.15 Semi-evergreen vine thicket with *Brachychiton rupestris* 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
- 12.9-10.18 *Angophora leiocarpa*, *Eucalyptus crebra* woodland on sedimentary rocks
- 12.9-10.19 *Eucalyptus fibrosa* subsp. *fibrosa* open forest on sedimentary rocks
- 12.9-10.20 *Eucalyptus montivaga* open forest on sedimentary rocks
- 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
- 12.11.6 *Corymbia citriodora*, *Eucalyptus crebra* open forest on metamorphics ± interbedded volcanics
- 12.11.7 *Eucalyptus crebra* woodland on metamorphics ± interbedded volcanics
- 12.11.8 *Eucalyptus melanophloia*, *E. crebra* woodland on metamorphics ± interbedded volcanics
- 12.11.9 *Eucalyptus tereticornis* open forest on metamorphics ± interbedded volcanics. Higher altitudes
- 12.11.10 Notophyll vine forest ± *Araucaria cunninghamii* on metamorphics ± interbedded volcanics
- 12.11.11 Araucarian microphyll vine forest on metamorphics ± interbedded volcanics; southern half of bioregion
- 12.11.14 *Eucalyptus crebra*, *E. tereticornis* woodland on metamorphics ± interbedded volcanics
- 12.11.17 *Eucalyptus acmenoides* or *E. portuensis* open forest on metamorphics ± interbedded volcanics

- 12.11.18 Eucalyptus moluccana tall open forest on metamorphics ± interbedded volcanics
- 12.11.22 Angophora leiocarpa, Eucalyptus crebra woodland on metamorphics ± interbedded volcanics
- 12.12.2 Eucalyptus pilularis tall open forest on Mesozoic to Proterozoic igneous rocks especially granite
- 12.12.3 Tall forest complex with Corymbia citriodora, Eucalyptus siderophloia or E. crebra or E. decolor, E. major and/or E. longirostrata, E. acmenoides or E. portuensis 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
- 12.12.9 Shrubby woodland with Eucalyptus dura on rocky peaks on Mesozoic to Proterozoic igneous rocks
- 12.12.12 Eucalyptus tereticornis, E. crebra or E. siderophloia, Lophostemon suaveolens open forest on granite
- 12.12.13 Araucarian complex microphyll to notophyll vine forest 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
- 12.12.24 Angophora leiocarpa, Eucalyptus crebra woodland on Mesozoic to Proterozoic igneous rocks
- 12.12.25 Eucalyptus fibrosa subsp. fibrosa tall woodland to open forest on Mesozoic to Proterozoic igneous rocks
- 12.12.28 Eucalyptus moluccana tall open forest 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.gov.au

Somerset Regional Council: www.somerset.qld.gov.au

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

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